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Business this week

Mar 22nd 2001
From The Economist print edition

Rates keep falling

America's Federal Reserve cut interest rates by half a percentage point to 5%. Investors had hoped for more; the Dow Jones Industrial Average and the Nasdaq index both continued to fall. America's consumer-price index rose more than expected in February, by 0.3%, to give a 12-month increase of 3.5%. America's trade deficit in goods and services widened slightly in January to $33.3 billion.

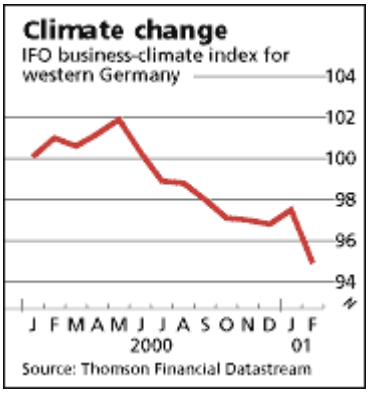
See article: How low will American rates go?

In an effort to revive its flagging economy, **Japan** in effect put its interest rates back to zero. The sudden shift in policy may help spur consumption and head off the consumer-price deflation that has dogged the Japanese economy for over a year. Yoshiro Mori, Japan's embattled prime minister, and George Bush promised co-operation after a meeting at the White House.

See article: Japan's sick economy

Europe's economies had appeared in better shape than those of Japan and America. However, Germany's closely watched IFO index of business confidence fell faster than anticipated in February. Industrial output in the euro area declined by an alarming 1.9% in January.

See article: Can the world escape recession?



Changing hands

BHP, an Australian mining group, announced it would merge with **Billiton**, a smaller British rival with South African roots. The combined firm would have a market capitalisation of nearly $30 billion, putting it behind only America's Alcoa in mining's league table. Rumours abounded that Britain's Anglo American or Canada's Alcan might launch a counterbid.

See article: Mining firms merge

Whitbread, a British leisure group, said it would sell 3,000 pubs to Morgan Grenfell Private Equity for £1.6 billion ($2.3 billion). Nomura, a Japanese investment firm with a pub chain, and Punch Taverns, Britain's second-largest landlord, lost out in their bids to top up their pub portfolios.

Spain's government announced the price range for an initial public offering of its remaining 53.9% stake in **Iberia**. The airline will be valued at up to *euro*1.95 billion ($1.75 billion) compared with over *euro*2.5 billion in 1999. Industrial unrest at Iberia and a volatile stockmarket may deter investors despite the price cut.

Interpublic, an American advertising company, agreed to pay $2.1 billion for another, True North Communications, to create a homegrown giant. A slowdown in advertising has made smaller firms attractive targets for the world's big ones. The names of France's Havas and Britain's WPP had been linked with True North Communications' in the past.

The ambition of **Coca-Cola**'s legendary boss, Roberto Goizueta, that Coke should one day replace tap water, seemed far-fetched. But new broom, Douglas Daft, announced investment in a system to make Coke available on tap in ordinary homes. A prototype is being tested. It may prove handy for bubble baths.

Suez Lyonnaise des Eaux, a big French utility, dropped the last three words of its name (except in France) to improve international recognition. It also relaunched its water division under the name **Ondeo**; another example of the popularity of bogus classicism in corporate rebranding.

The European Commission ruled that **Deutsche Post**, Germany's 75% state-owned post service, was guilty of illegally cross-subsidising its business parcel arm. The case was first brought by UPS, an American rival, in 1994. The company was fined *euro*24m ($21.6m) and will create a separate parcel-delivery subsidiary.

See article: Breaking up Deutsche Post

Moving on

Boeing, America's biggest aircraft manufacturer, is to move its headquarters from Seattle after 86 years in the Pacific coast city. It is looking for a "culturally diverse" alternative with access to global markets, but has not ruled out Dallas/Fort Worth.

See article: Boeing and Seattle

Chung Ju Yung, founder of South Korea's **Hyundai Group**, died at the age of 86, leaving restructuring of the troubled industrial group, South Korea's biggest, in the hands of his numerous quarrelling offspring.

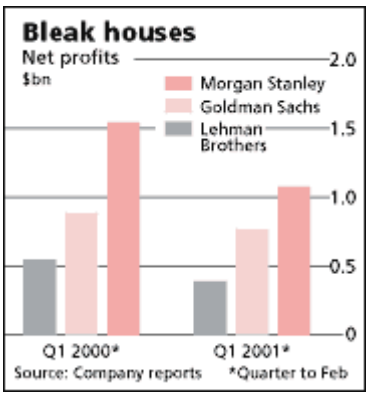
André Navarri resigned as chief executive of **Valeo**, a French car-parts maker, after a profits warning and a "deep strategic review" at the company. He had been in charge for less than a year.

British Telecom, in debt to the tune of £30 billion ($43 billion), stood up leading investors for a dinner date. Shareholders wanted rapid action over BT's debt pile and looked set to demand the heads of the chairman and the chief executive over the soup. BT would not confirm that dinner was ever planned, let alone cancelled.

See article: BT's debt disaster

Money talk

Wall Street's investment banks have suffered from America's economic malaise. Goldman Sachs announced that profits for the quarter to the end of February were down 13% to $768m compared with the same period a year earlier. Lehman Brothers said that profits for the last quarter were down 29% to $387m, and profits at Morgan Stanley fell 30% to $1.0 billion over the same period. Conditions seem likely to get worse in the current quarter.



Nasdaq, America's high-tech stockmarket, is keen to take a majority stake in **Easdaq**, its rather less successful European equivalent, for *euro*14m ($12m). Easdaq shareholders will vote on the long-anticipated deal on March 30th.

A disgruntled investor offered to return the body of **Enrico Cuccia**, former head of Italy's Mediobanca, stolen from a family mausoleum. But only if Milan's MIB30 stockmarket index shows a marked upswing.

Correction Japan's 0.8% rise in GDP in the fourth quarter was not, as we said last week, at an annual rate.

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The world this week

Mar 22nd 2001
From The Economist print edition

Balkan dangers

NATO said it was intensifying efforts to stop ethnic-Albanian fighters crossing the border from Kosovo into **Macedonia**. A new guerrilla movement has emerged in the hills north of Tetovo, a stronghold of the country's Albanian minority. But America, Britain and other alliance countries were reluctant to send extra troops to the region. A policeman was shot dead and another injured in Skopje, Macedonia's capital, raising fears that the violence might spread.

See article: War in the Balkans, again?

Following last month's arrest of an American FBI agent for spying for **Russia**, the United States expelled six Russian diplomats and told around 50 more support staff to go in due course. The Kremlin was expected to retaliate.

See article: The expulsion of the Russians

Bertrand Delanoë was elected mayor of Paris, the first left-winger to win the job for more than a century. In other local elections in **France**, the results were mixed, with the right doing a bit better than expected.

AP

See article: France swings left and right

Five **German** service-sector trade unions merged to form ver.di, the biggest trade union in the free world.

See article: Germany's mammoth trade union

Kemal Dervis, **Turkey**'s new economic minister, set out steps to clear up the country's economic mess. The government also listed the judicial and other reforms it is ready to make to help get Turkey into the EU.

See article: A hopeful man for Turkey's economy

ETA, the Basque separatist terror group, killed the deputy mayor of a small town in the **Basque** region a week after setting off two car-bombs in Mediterranean resorts.

Reuters

As Britain's attempts to stem a **foot-and-mouth** epidemic appeared to be failing, the first cases were reported in the Netherlands and Ireland.

See article: Bagehot: Foot, mouth and election

No dissent

The military-led government of **Pakistan** detained opposition leaders in an effort to stop a rally calling for the restoration of democracy.

In the latest of a series of explosions in **China**, two children died in an accidental blast at an illegal fireworks factory in Anhui province. An earlier explosion blamed on fireworks killed 42 people, mostly children, in Jiangxi province. A series of explosions in the city of Shijiazhuang that killed 108 people was blamed on malcontents.

See article: Explosions in China

Gao Zhan, a Chinese academic permanently resident in the United States, was detained during a visit to her family in **China**. A government spokesman said she had been involved in "activities damaging state security".

The **Indian army** set up a court of inquiry to examine the conduct of officials shown on a website apparently receiving bribes. Earlier, the defence minister, George Fernandes, had resigned.

See article: India's corruption scandal

No thank you

A proposed visit by a Commonwealth ministerial team to look into the intimidation of **Zimbabwe**'s judiciary and the press was rejected by the government.

The United Nations confirmed that all the warring parties in the war in **Congo** were pulling back a little from their frontline positions.

To the dismay of **Ugandans** who still hoped for a broad-based government, Kizza Besigye, who had come second to the incumbent, Yoweri Museveni, in the recent presidential election, was prevented from leaving the country in order to face questioning by police.

In what was seen as a test case, Senegal's highest court said it could not try **Hissène Habré**, a former ruler of Chad who has lived in Senegal since 1990, because his alleged crimes had been committed outside Senegal.

Ariel Sharon, Israel's new prime minister, joined the line of world leaders paying court to George Bush. Mr Sharon stressed Palestinian culpability for the continuing violence in the region. Mr Bush said the Americans would facilitate, but not force, peace.

Reuters

Mary Robinson, frustrated by lack of support and money, announced that she would step down as United Nations human-rights commissioner in September. A British government minister, Mo Mowlam, is among her suggested successors.

The International Court of Justice ruled on a long-standing territorial dispute between two Gulf emirates, **Bahrain and Qatar**. Both countries accepted the ruling.

Argentine cries again

More turmoil in **Argentina**: Domingo Cavallo became the country's third economy minister in three weeks, after spending cuts proposed by his predecessor had provoked the rupture of President Fernando de la Rua's governing Alliance. Mr Cavallo, who put in place the system that ties the country's currency to the dollar, asked for emergency powers to impose spending cuts, and tax and tariff changes.

See article: Cavallo to the rescue in Argentina?

EPA In **Brazil**, the world's largest offshore oil platform sank, days after an explosion that had killed ten workers. It produced around 5% of the country's oil output. Its loss contributed to mild currency jitters—and a surprise interest-rate rise.

See article: Brazil's currency dilemmas

The **United States** Senate, debating the McCain-Feingold bill to reform campaign finance, passed an amendment to help candidates pay for their campaigns when faced by a rich challenger.

Demand for electricity again exceeded supply in **California**, and the state was obliged to impose rolling blackouts over several days.

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Can the world escape recession?

Mar 22nd 2001
From The Economist print edition

Could the world be heading for its first global recession?

LAST year, the world economy enjoyed spectacular growth of almost 5%—its fastest for 16 years. This year it looks much less buoyant. America and Japan, the two biggest economies, accounting for 46% of world output, are both teetering on the brink of recession. Stockmarkets almost everywhere are tumbling: over the past year nearly $10 trillion has been wiped off global share values—equivalent to America's annual output. And fears are mounting in some emerging economies too, notably Argentina and Turkey. Is the world heading into recession?

The central banks of America and Japan are clearly worried. This week, America's Fed cut interest rates by half a percentage point for the third time this year. The Bank of Japan, in effect, pushed its rates back down to zero. Such easing is welcome in both economies. It will help to support demand. Despite these steps, however, both countries may still move into recession this year. If they do, it will be the first time since 1974 that this has happened simultaneously in the world's two biggest economies. During each of America's previous three recessions, Japan boomed. And when Japan's economy slumped in 1998, America's continued to roar.

Today it is a different story. Even if America technically escapes a recession (defined as two consecutive quarters of falling output) this year, it will experience a sharp slowdown. Its GDP probably increased slightly in the first quarter, but rising inventories and a slump in capital spending signal more weakness ahead.

As a result of falling share prices, the net worth of American households fell in 2000 for the first time since records began 55 years ago. Lower share prices are denting confidence. In a recent survey by the University of Michigan (carried out before the latest plunge in stocks), two-thirds of respondents believed that the economy was already in recession. The challenge for the Fed is to stabilise the economy without prompting suspicions that it is cutting interest rates to bail out investors. The central bank is to be commended, therefore, for having the nerve to cut interest rates by a bit less than the market was expecting this week, while making it clear that it will cut further if the economy continues to weaken.

The possibility that Japan's economy will head into recession may seem less shocking. After all, it has stagnated for the best part of a decade. Yet over the past couple of years Japan's economic problems have been getting worse (see article). Japan is the only developed economy to have experienced true deflation since the 1930s. This means that, although its real GDP has increased in each of the past two years, GDP in money terms has shrunk. Deflation has dragged the economy into a vicious circle, where falling prices encourage households to delay spending, thereby pushing prices lower still. Meanwhile, deflation increases the real burden of debt, further choking demand.

The Bank of Japan's latest move is still not bold enough, but it is a step in the right direction. A return to zero interest rates is less significant than the introduction of what is, in effect, an inflation target: the Bank of Japan has said it will maintain its new policy until inflation rises above zero. Whether it achieves this is another matter, but this inflation target of sorts may help to persuade people that deflation is coming to an end, and the extra liquidity should nudge down the yen. The trouble is, a sharp fall in the yen will be unpopular in Washington if America itself sinks into recession. The Bank of Japan should have acted while America was still booming.

A global plunge

Japan's policy paralysis has long held down its own economy. But policymakers in Washington are now concerned that the economic and financial problems of the two giants could reinforce each another. The

dive on Wall Street and a slowing American economy have hurt Japanese share prices in recent weeks. In turn, fears about the impact of a falling stockmarket on Japan's banking system have helped to drive American shares lower still. But what about the impact on the rest of the world economy? Globalisation of goods and capital markets have spread the benefits of both the American economic model and America's economic boom further afield. Could it now globalise an American recession?

Conventional economic models, which focus on trade links, tend to understate the impact of an American recession on the rest of the world. In recent years, other channels have become more important, notably foreign direct investment and financial contagion through stockmarkets (see article). Against this background, the European Central Bank, the only major central bank not to cut interest rates this year, may be too complacent about Europe's growth prospects. The troubles in America and Japan could dent growth by more than the ECB currently expects. For example, share prices in several European markets have fallen even further than on Wall Street, and even though fewer Europeans own shares, the plunge in share prices is likely to dent confidence—witness the sharp fall in Germany's IFO business indicator this week.

Another new channel through which the recession virus could spread is the global information-technology supply chain that links America, Japan and Asia. As America's IT spending bubble bursts, Asia's exports will slump. South Korea's GDP fell in the fourth quarter of last year. Recession in America and Japan, emerging Asia's two biggest export markets, would severely hit the region.

World GDP has not fallen in any year since the 1930s. Even during the oil crisis of the 1970s, world GDP rose. A true global recession would not only be painful, but it would carry huge dangers, encouraging countries once again to retreat behind protectionist barriers. With luck and some skill, a global slump can be avoided. Policymakers must be ready to support economies, if necessary, by cutting interest rates or taxes. They must also ensure that the new world economy's first recession does not send globalisation itself into reverse.

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Argentina's desperate choices

Mar 22nd 2001
From The Economist print edition

Even Domingo Cavallo may not be able to stave off a debt default

AP

IT IS fitting that Domingo Cavallo should have been drafted in this week as Argentina's new economy minister—the third person to hold that job this month. He is now seen as the only man capable of maintaining the currency-board system that he set up a decade ago. That system pegs the peso by law at parity to the dollar and, in effect, hands monetary policy over to the United States Federal Reserve. Not only has the device killed hyperinflation; for much of the 1990s, it delivered strong growth. But Argentina's economy has now been locked in a recession for almost three years. The currency board has become a straitjacket.

In January, President Fernando de la Rua's Alliance government thought it had at last found the key. An agreement with the IMF, involving loans and credit guarantees amounting to $39.7 billion, seemed to offer a respite. So did cuts in American interest rates and a (temporary) weakening of the mighty dollar, and thus the peso.

The economy, however, did not pick up, though the fiscal deficit did. With markets twitchy, Mr de la Rua turned to Ricardo Lopez Murphy, a free-market economist from his Radical party. Mr Lopez did as he was asked: on March 16th, he announced budget cuts of $2 billion this year, and $2.5 billion in 2002. But over half the proposed cuts were in education spending, prompting three ministers, and six other senior officials, to resign, and Frepaso, the Alliance's junior (and more left-wing) partner, to walk out of the government.

Investors panicked. So did Mr de la Rua. He clumsily abandoned Mr Lopez in favour of Mr Cavallo. Mr Cavallo now leads a small conservative party, but he has two bigger assets. With a well-cultivated image as an economic saviour, he has the trust of investors. And unlike the dithering Mr de la Rua, he is forcefully decisive. Will those qualities be enough?

The political test

Argentina's drama is that it has almost run out of room for economic manoeuvre. On the one hand, the strength of the dollar has made it hard for Argentina's exports (only 11% of which go to the United States) to compete, especially after Brazil, its main trading partner, devalued in 1999. The economy has had to adjust through deflation: prices and wages have fallen. That has simply prolonged the recession.

Nor can the government freely use fiscal policy to kick the economy into action. Fiscal profligacy in the later years of Mr Menem, Mr de la Rua's predecessor, meant that Argentina piled up debt, which now stands at close to 50% of GDP. Argentina is now in a vicious circle. The political fragility of Mr de la Rua's government has worried investors, forcing up interest rates, which depress growth and add to the debt burden, while the recession means tax revenues are falling.

So what can Mr Cavallo do? Abandoning the currency board would still be the most expensive option, because the economy is already partly dollarised. Firms would be destroyed by the burden of their dollar debts, intensifying the recession. In an announcement on March 21st, Mr Cavallo gave few details of how he would change spending and taxes to cut the budget deficit by a proposed $3 billion. But he did say that he intended to tax financial transactions and would think about reforming import tariffs—lowering them on capital goods, raising them on consumer goods.

Politically, spending cuts pose the biggest problem. There is much scope to eliminate waste, but this is hard to do quickly. So Mr Cavallo may seek to use his reputation to persuade Wall Street and the IMF to back a rescheduling of Argentina's debts (or, if you prefer, a default).

The question is whether Mr Cavallo will get backing for his programme. He will have to persuade Congress to grant him emergency powers (see article). Argentine politicians share responsibility for the failure to reform the state. It would be nice to think that they will now act in the national interest. But they may not. Having torn up the Alliance with which he was elected, Mr de la Rua has to create a new, cross-party coalition, just seven months before congressional elections. That would be hard even for a more effective politician.

Wish him well, though. Failure would mean that Argentina would almost certainly find itself heading for a unilateral debt default, which might increase the cost of credit in all emerging markets. Meanwhile, if some bright economist should argue that currency-boards are a miracle cure for any unstable third-world country, irrespective of its circumstances, show him the door.

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Tort on stilts

Mar 22nd 2001
From The Economist print edition

Stop reading those articles about Julia Roberts. Have a think about corporate liability

AP

MOST Americans say they hate lawyers. In America, even some lawyers say they hate lawyers. But everybody prefers lawyers to evil blood-sucking corporations. Julia Roberts is a strong contender for an Academy Award this weekend for her portrayal of Erin Brockovich—a legal assistant with problems, yet brave enough, smart enough and just good-looking enough to call capitalism to account. This love-hate relationship is a national obsession. John Grisham, a former personal-injury lawyer, is among America's most popular authors. Hardly an evening goes by without a legal drama on television. Sexy lawyers with interestingly complicated lives fight the ogres of big business; slimy ones defend them cynically before hurrying off to torture puppies.

Using the law to bash business can get out of hand. When it works, America's corporate-liability regime encourages companies to serve the public better. At its best, it beats the alternative—namely, overweening regulation. At its worst, though, it fails to spur good conduct and merely transfers wealth from taxpayers and consumers to lawyers, ruining many a business into the bargain. The real events on which "Erin Brockovich" is based, in fact, seem to conform more to this second type than to the first, but here is not the place to dwell on Hollywood's fearless quest for truth. With a new president in the White House—one less in hock to the plaintiffs' bar, and with a good record of tort reform in Texas—the question is whether further curbs on corporate liability would make sense, and whether they might now be possible.

As George Bush's record in Texas suggests, recent years have seen plenty of action on tort reform in particular states. Here and there, new limits have been placed on punitive damages; the law has been changed to make it harder to sue companies only tangentially related to the harm in question; there are new penalties for plaintiffs bringing frivolous suits; and so forth. Changes of this kind have probably contributed to a reduction in the number of suits being brought.

But as the number of cases has diminished, the size of awards has soared, stretching the link between harm suffered and damages recovered to the point of invisibility. In the face of this risk, many companies settle cases before they come to trial; this can be a form of legalised extortion. New fields of mischief have opened up—notably, cases brought by shareholders against the companies they own (an especially self-defeating kind of litigation, except for lawyers). Colossal awards in tobacco and asbestos cases have given lawyers vast new resources, and political clout, to extend their scope (see article). Meanwhile, piecemeal reform in the states has added to the problem of jurisdiction hopping, with lawyers hunting for the best place in which to lodge their cases. In short, further curbs are needed.

The new president has talked of making it easier to get big cases moved to federal courts. On balance, this is a good idea: a remedy for jurisdiction hopping. It would also shift the focus of reform from state laws to federal laws, making the issue worthy of the time Congress would need to spend on it.

Here are some further suggestions. Tighten caps on punitive damages again. Even better, deem that punitive damages should be paid not to plaintiffs (and their lawyers) but to the government: punitive damages are akin to a fine, and should not form part of the victims' compensation (or the lawyers' reward). Tighter limits on class-action lawsuits are called for: under present rules, too many of the classes are artificial, lumping together plaintiffs who may not even be aware that an action has been brought on their behalf.

Congress should also think hard about the so-called English rule, under which unsuccessful plaintiffs have to pay defendants' costs. It would be a mistake to go all the way in this. If defendants had discretion in running up vast costs, with the bill automatically handed to the unsuccessful plaintiff, even the worthiest cases might never be brought, so intimidating would that danger be. The award of costs ought to be at the court's discretion, with due regard both to whether the defendants' costs were reasonable and to the

prima facie merit of the plaintiffs' case.

Hollywood must help as well. How about getting Julia Roberts to play a manager driven to a nervous breakdown by a specious environmental lawsuit? In the last half-hour, she would recover improbably, see a prominent green activist jailed for murder, and consummate a romantic attachment to Brad Pitt, the crusading journalist who helped expose the whole scam. It's yours, Mr Spielberg, with our blessing.

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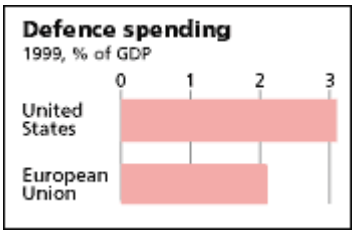
New Europe, new America

Mar 22nd 2001
From The Economist print edition

Pulling together, or pulling apart?



IF THERE could ever be a good moment for Europeans and Americans to relish another Balkan imbroglio, the fighting by ethnic-Albanians attempting to destabilise Macedonia is not it. In theory, such flare-ups should offer the European Union a chance to show some military mettle for all its talk of having a rapid-reaction force of its own, but in practice the Macedonian crisis comes when Europeans are still wholly unready for reaction. Meanwhile, the Bush administration is seeking to reduce America's commitments, not add new ones. Americans and Europeans in NATO have their fingers crossed that stronger patrols on the Kosovo-Macedonia border, to cut supplies to the rebels, will suffice. If not, they would be foolish to stand by while peace elsewhere in the region is put at risk. But even if they squeeze safely past this new Balkan danger, will the EU's ambitions to carry more weight in the world, and George Bush's ambivalence about abroad, help Europe and America pull together, or pull apart?

The EU leaders gathering on March 23rd for their summit in Stockholm already have plenty of pressing business: defending their common agricultural policy from the financial ravages of foot-and-mouth disease, steering Europe's still wobbly single currency, the euro, and preparing for the enlargement of the EU itself, a continent-sized redesign that will affect all of Europe, from the Baltic to the Balkans. Given the sheer scale of the work in progress, Europeans are inevitably preoccupied with managing the stresses all this causes within the EU itself, particularly the testier relations between a bigger Germany and a pricklier France (see article), rather than tending to the strains that have arisen with America, including those that concern Europe's new military ambitions.

Some think it is anyway time that Europe stepped out of America's shadow in security matters. Britain and France, Europe's two warrior nations, led the charge to give the EU better-equipped and more mobile military forces of its own by 2003 in part out of a shared shame at the feeble European contribution to the Kosovo campaign two years ago. Britain genuinely wants Europeans to do more that will benefit NATO and the alliance with America. France is equally keen to show military leadership, especially now that it cannot take Germany's followership for granted in other areas. But it likes to emphasise Europe's defence "autonomy". Germany, for its part, likes anything that will build a tighter, more impressive-looking Union, and realises that, without military clout, the EU will never be a world-class power.

Despite all these differences in expectation, the EU's defence project, if done well, can still do something for everyone. More effective and deployable European forces that would gratify Britain should also please the Americans. They have long fretted, rightly, that Europe carries too little of NATO's defence burden; here at last is a way of giving the alliance more tools, for use perhaps in a future, Macedonia-like crisis. Stick a European arm-badge on some of them, and France can safely swell with Euro-pride, even as the EU and NATO co-ordinate closely who does what, with troops and equipment on which NATO anyway has first call. Indeed, Germany and Britain hope the new EU force will draw France closer into NATO, not pull NATO and Europe apart.

Getting serious about defence should also raise the EU's sights beyond its own backyard. For all the concern about the Balkans, the biggest challenges to Europe's interests and friends may well come in Africa, the Middle East or Asia. Europeans ought to be better equipped to lend a hand. In practice, America may still prefer to do most military things its own way, when it is ready to act militarily at all. That is why some Americans choose to see Europe's defence ambitions as a challenge. But America cannot have it both ways: if Europeans chip in more, they will deserve to be listened to more.

Of braid, brawn and burdens

Will Europeans really pull their weight? The greater risk is that the EU's new defence effort will damage

NATO not by succeeding too well, but by falling short of its goal. By 2003 the EU will be ready at best for some pretty simple soldiering. The costly equipment for a true fighting force will come much later, if at all. Most governments have stopped cutting their defence budgets. Some are reorganising their armed forces for more useful duty. But none has yet put up the money needed to turn Europe's paper army into a proper fighting force. So far, at least, it is all braid and no brawn.

Europeans have their worries about Mr Bush's America too. Talk of burden-sharing could turn out to be just a cover for burden-shedding. Thinking out loud about an American pull-out from the Balkans unnerved European officials who had lived through the near bust-up of the transatlantic alliance over the war in Bosnia. Then, too, America thought it did not "have a dog in that fight". But if NATO has a rationale, and if fighting in the Balkans—the worst in Europe in 50 years—should not be part of it, it is hard to see what should.

In other words, if the alliance is to endure, America needs to stay engaged in Europe's security affairs and Europeans need to be ready to do their bit, in the Balkans certainly, but also elsewhere. Even then there are some difficult discussions to come: over NATO's own expansion, America's missile defences and everyone's relations with Russia. Pulling together is really the only option, but it will take two to do it.

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Caught in the Net

Mar 22nd 2001
From The Economist print edition

India's corruption scandal shows how much the Internet is changing politics

BANGARU LAXMAN, the president of the main party in India's ruling coalition, made several mistakes. One was to accept some money that looked very like a bribe. Another was to take it without checking the credentials of those who offered it. But Mr Laxman also had bad luck. His temptation took place in the Internet age, when not all journalists are constrained by lumbering technology and nervous proprietors. A few years ago, such an audacious sting would probably not have been organised. Nowadays, with little to lose, lots to gain and the ability to publish instantly and extensively, the press is freer than ever before.

Mr Laxman and India's defence minister, George Fernandes, have had to step down in disgrace. Jaya Jaitly, the president of the Samata Party, which is also in the ruling coalition, has had to resign. Indeed, the entire government may yet fall. The clear victor, however, is the Internet, which is opening up government everywhere to scrutiny on a scale that has never been seen before.

It does this in several ways. First, the Internet vastly lowers the costs of entry into the media preserve. A website costs much less than a printing press to set up, and its running costs are dramatically lower. An Internet newspaper dispenses with newsprint and physical distribution, the two largest costs for any newspaper. With the Internet, anyone can be a magazine or book publisher, an investigative reporter or even a television station. Second, the Net's reach is far greater. In the latest scandal, interested parties not just in India but all over the world had instant access to an impressive mass of material from the moment of publication.

In India, it might be argued, such a development does not radically alter the balance between the government and the governed, since a lively and free press has long existed there. Still, it was in fact an Internet company, tehelka.com, that carried out the exercise, and not one of India's established and excellent, though sometimes rather cautious, newspapers or magazines. But the real advantage of the Internet will be seen in countries where the existing press is much less free than India's. The changes can already be seen. In Malaysia, for example, the only objective reporting to be found comes from malaysiakini.com. In Singapore, sintercom.org is taking a close look at press censorship. During the recent arguments about the merits of putting General Augusto Pinochet on trial, Chileans could get the most objective information not from Chile's papers, but from elmostrador.cl.

And no wonder. Internet sites are intrinsically harder to control than newspapers. They have no valuable and immovable presses to seize, no newsprint to ration, no distributors to lean on (though Internet service-providers can be intimidated). If necessary, a site can easily move abroad.

Oxygen in the ether

You can judge a man by his enemies, it is said, and the same goes for technologies. China is more neurotic about the Internet than almost any other country, blocking access to a long list of forbidden sites that include those of the *New York Times*, the BBC and CNN. That would not prevent a really determined reader from logging on via a service-provider based abroad, though for the moment that is prohibitively expensive, or from using a proxy server, though the authorities are getting the measure of that.

It is, however, a losing battle. China already has 30m Internet users, and the number is likely to grow dramatically. Dissident organisations abroad can, and do, send their (unsolicited) reports to hundreds of thousands of e-mail recipients in China. There, as elsewhere, thousands of bulletin boards, on which people post news and views that could never in the past appear in print, have sprung up. As the amount of information, and the number of providers, on the Internet expands, the medium will become harder

and harder to monitor. Much of the information may be rubbish, but no wonder the world's despots are worried.

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Who will condemn China?

Mar 22nd 2001
From The Economist print edition

China's human-rights record is up for debate at the United Nations. Members should vote for censure

AP

THOSE who prefer quiet diplomacy to the megaphone kind often argue that shouting at the Chinese government about the way it treats its people is counter-productive. Far better, they argue, to work with the Chinese, not against them, sending teams to teach them about the rule of law and inspectors to look at their prisons. In the meantime, of course, the non-confrontational attitude allows trade to flourish.

The trouble with this approach is that it does not seem to be working. Most independent observers, as well as America's State Department, believe that in recent years the Chinese government's treatment of its people has been getting worse, not better, probably because the Communist Party feels itself under threat. First the embryonic China Democracy Party was smashed. More recently, hundreds, even thousands, of people have been locked up for simply wanting to practise a form of meditative exercise called Falun Gong. As many as 100 Falun Gong members, say the Americans, have been tortured to death. Tibetans and Uighurs are more actively repressed than ever. Psychiatric wards are filled with dissidents.

So the Americans have this year, as last, tabled a motion of censure at the annual meeting of the UN Commission on Human Rights. And once again, Europe has chosen the spineless option. The EU's foreign ministers decided this week that they would not co-sponsor America's resolution, though they would vote in favour of it. That might not sound too bad, but for one thing: there will probably not be a vote.

If past form is anything to go by, the Chinese will head off the embarrassment by putting down a "no-action motion" and then twisting the arms of a majority of the commission's 53 members to make sure that it goes through. China has been busily buying votes, by making it clear to poor countries that their chances of Chinese aid are intimately linked to the way they raise their hands in Geneva. But if the no-action motion succeeds, there will not even be a debate, far less a vote, on America's highly critical resolution. The proper course for the EU would have been to co-sponsor the original resolution, as it used to do until a few years ago, when more commercial considerations intervened after back-to-back trips to Beijing by Helmut Kohl and Jacques Chirac. Instead, the EU has taken the hypocrite's way out.

But why all this fuss about a vote that never had much chance of success in the first place? Because symbols matter, because China evidently cares about the Geneva vote (especially as it may influence the decision on who gets the 2008 Olympics) and because the UN remains the last place where China's human-rights record can be seriously scrutinised. The lure of trade long ago detached human rights from matters economic. Once China joins the World Trade Organisation, even the annual American ritual of deciding whether China's record is such as to allow it trade privileges will come to an end. As for Europe, its "dialogue" with the Chinese on human rights is carried on far out of sight by relatively lowly officials, not ministers.

Solidly invertebrate Europe

One of the sorriest roles in all of this belongs to Britain, notably to its foreign secretary, Robin Cook, who once bravely spoke of giving British foreign policy an "ethical dimension". Britain, apparently, wanted to see a tougher line on China at Geneva, but in the end bowed, as it has done ever since Mr Cook took over, to "European solidarity", and backed the invertebrate line. Britain and other countries that claim to care about human rights, such as the Netherlands, Denmark and Sweden, could co-sponsor the American resolution as independent countries. But don't count on it.

The UN’s human-rights commissioner, Mary Robinson, announced her resignation this week, funnily enough at the very moment that the EU was reaching its decision. She said she thought she could achieve more “outside the constraints that a multilateral organisation inevitably imposes”. Fancy.

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Letters

Mar 22nd 2001
From The Economist print edition

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Poor Africa

SIR—The vicious and daunting set of circumstances facing Africa— poverty and disease, low levels of education and a history of colonial occupation—are by no means peculiar to that continent ("Africa's elusive dawn", February 27th). Countries and regions worldwide have grappled with these problems before and have overcome them; often in distant times a lot harsher than today's relatively benign age of high technology, modern medicine, foreign aid and democracies able to serve as models of good behaviour.

We in Africa have to start creating wealth for ourselves, especially as the recipe is now blindingly obvious: private property, honest government, free elections, a tolerance of dissent and the unfettered rule of law (to quote your article). We might then be surprised to see how much more eager the rest of the world is to help us along.

ROBERT GENTLE
Johannesburg

SIR—You say that Zambia's GDP per head in 1964 was nearly twice that of South Korea's and that South Koreans are now 27 times richer than Zambians. You imply that this is the result of the country being plundered by its leaders. The truth is a little more complex. Two-thirds of Zambia's GDP in 1964 came from copper exports and a third of that amount never reached Zambia. It was retained by mining and other companies as dividends and unearned royalties. The proportion of GDP that reached Zambia was very unevenly distributed between a small white population (2% of the total and 40% of income) and the mass of the black population (98% of the total and 60% of income). The average Zambian was certainly worse off than the average South Korean in 1964.

Since that date, the population has tripled, and both the real price of copper and copper production have fallen by half. Zambia's unwise nationalisation of the mines in 1969 (as advised by the best of British development economists) may have contributed to declining copper production but population pressures, shifts in the terms of trade since the 1970s and a burden of debt to the West that originated then in recycled petro-dollars have contributed massively to the impoverishment of the country.

HUGH MACMILLAN
Oxford

SIR—You are right that Africans and Europeans were trading on equal terms before George Goldie, Major Frederick Lugard, Major Edward Hewett and other similar Europeans used the maxim gun and false treaties to deprive black African states of their independence. The black African states created by Europeans at the Berlin Conference of 1884-85 were fakes and mirages for the purposes of furthering Europe's interests. Today, black Africa's real rulers are the World Bank, IMF and multinational corporations. These institutions have the benefits of Africa's prosperity without the burdens.

Most African leaders are too gullible, too weak or too corrupt to be effective. They have not been able to rise to the occasion.

CHIEF RICHARD AKINJIDE
Lagos

Swiss stay out

SIR—In your leader on Switzerland you fail to mention the tremendous political impact membership of the EU would have on the country ("The Swiss say no", March 10th). Switzerland is a true democracy; Swiss citizens have effective instruments to make the federal and cantonal governments act how they want them to do. As the *acquis communautaire* is not negotiable it is evident that EU membership would compromise severely our democratic rights in important fields such as taxes, competition, agriculture and, in the foreseeable future, foreign policy and immigration.

At the moment, we enjoy the many benefits of a federalist system with a high degree of subsidiarity. EU membership would cause a substantial shift of power away from the cantons to the federal government. As the *Neue Zürcher Zeitung* puts it: "Swiss citizens are quite aware of the fact that Switzerland has always been part of the European house. However, they are not prepared to give away the key to their flat."

STEPHAN LOEB
Basle

Mine host

SIR—I must correct your statement that Arkansas has the only diamond mine in North America ("Trouble in McArkansas", March 10th). You have forgotten about Canada. Last year, Canada produced 2.6m carats of diamonds valued at C$638m ($430m). Canada's North-West Territories are rapidly becoming one of the world's most important diamond producing regions. Ekati, our first world-class diamond mine, opened in October 1998 and produces high-value gem-quality diamonds. Diavik, our second big diamond mine, is under construction and is scheduled to begin production in early 2003.

A number of other significant diamond mines in Canada's north are also planned. Canada currently accounts for 6% of world diamond production by value and according to some estimates will be one of the world's top four producers, at 13% of world production, within the next seven years. Little Rock may be in Arkansas but the big rocks are in Canada.

TOM MACDONALD
Canadian High Commission
London

Power point

SIR—It is wrong to say that California's utilities are bankrupt ("Beyond the pool", March 3rd). While San Diego Gas & Electric, whose parent company is Sempra Energy, has certainly suffered as a result of market dysfunction and the failure to manage supply and demand, it remains financially sound. This is because we were the first company to get out from under the price cap, and to embrace the new market fully and quickly, rather than to try to "have our cake and eat it."

However, let me commend you for the space you devote to real-time metering. Conservation is everyone's duty but it is a real imperative in California. Technology can help, and real-time meters are an excellent example.

STEPHEN BAUM
Chairman, president and CEO, Sempra Energy
San Diego

Clinton's backers

SIR—Imagine my surprise at reading that West Hollywood and Sodom are the only places (outside New York) where Bill Clinton's "recent travails" would endear him to voters (Lexington, March 10th). The reference to gay voters is unmistakable; both cities are known for their gay residents, although Sodom was also known for its lack of hospitality, which could not be said of West Hollywood. The implication that gay people would be any less outraged by Mr Clinton's recent behaviour is absurd. You should direct your ire at the former White House resident himself; many of his recent problems are decidedly heterosexual in nature.

PORTER WHITE
Charlottesville, Virginia

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Scenes from a marriage

Mar 22nd 2001 | PARIS AND BERLIN
From The Economist print edition

For 50 years, France and Germany have been jointly driving Europe. But is this partnership heading for divorce?

A FEW weeks before German unification, at a Franco-German summit in 1990, the French president, François Mitterrand, gave what *Le Monde* called a "bitter" little speech. Mitterrand declared that France had "no complexes" about the emergence of a great new German power at the heart of Europe. A new era for Europe was opening up, in which he predicted there would be "no lack of conflicts, rivalries and misunderstandings." Indeed, he went on, "I don't know why I speak of the future."

His German hosts were aghast. On the eve of the greatest event in their post-war history, they had expected a little more enthusiasm from their self-proclaimed "closest friend and most important partner". Mitterrand's claim that France had "no complexes" was clearly disingenuous: this was the man who, after the fall of the Berlin wall, had rushed off for talks with the Russian president, Mikhail Gorbachev, and then to see the East German leader, Erich Honecker, apparently in a desperate bid to prevent unification. But in predicting rising tensions between the two countries that had led Europe so effectively for the previous 40 years, Mitterrand was absolutely right.

Over the past decade, the squabbles and sulks have become ever more frequent and public. France and Germany have rowed not just over German unification but also over German recognition of Croatia; the resumption of French nuclear tests (without consultation); French moves (again without consultation) to an all-professional army; French resistance to a German "stability pact" for Europe's single currency; French insistence on a French head for the European Central Bank; German demands for a reduction in its contribution to Europe's budget; reform of Europe's common agricultural policy (which favours France); European enlargement (of which France is wary); the reweighting of votes in the European Council (to take account of Germany's larger population); relations with America; relations with Russia. The list goes on and on.

For the past half-century, both sides have repeated the mantra that nothing can happen in Europe unless the continent's two heavyweights agree. Their unique partnership was at once indispensable and irreplaceable. Yet so much seems to divide the two countries that it is difficult to see how this marriage ever worked. France is an old, traditionally centralised, Catholic, hierarchical country where the *état nation*—the state as nation—is not just a political concept, but a way of life. Germany is a rather new, highly decentralised, more Protestant, now deeply democratic country which abhors, for historical reasons, anything smacking of an authoritarian state. The French are a fiery, temperamental, elitist people with a penchant for *les demi-vérités qui arrangent,* convenient half-truths; the Germans, more down-to-earth, sentimental and egalitarian, prefer *les vérités qui dérangent*—uncomfortable truths.

The two countries' visions of Europe, in so far as they are known, appear totally opposed. Most Germans want a federal Europe, albeit based on nation-states, with its own constitution, strong government, proper parliament, directly-elected president (one day) and a single but non-exclusive *avant-garde*, or inner group of countries keen to move ahead faster than the rest. For the Germans, a common European

foreign and security policy is an essential part of this vision. They know they cannot act unilaterally, and insist that they have no desire to; for if they ever tried, they would, in the words of their Green foreign minister, Joschka Fischer, “crash straight into the sandbank of an anti-German coalition.”

Although both Jacques Delors, the former president of the European Commission, and President Jacques Chirac have espoused the catch-all term “federation of nation-states”, many of France’s ruling elite prefer an “inter-governmental” approach, run by member-governments themselves, not a supra-national one. The French seem to be increasingly allergic to anything smacking of an integrated federation. Most of them oppose a European government or president. They are nervous about a constitution. They would prefer to see different groups of countries working together on different issues (in the jargon, they prefer “variable geometry” to an inner “hard core”). And they stoutly resist any idea of abandoning their sovereignty over foreign and security policy.

Some leading French officials, increasingly nervous about German federal designs, secretly confess that their ideal would be a *directoire* of the biggest countries: France, Germany, Britain, Spain, Italy and eventually Poland. But even they admit that this could never work.

Personal animosities

The French tend to blame the current German chancellor for the couple’s present woes. They feel that Gerhard Schröder, a Protestant from the north of Germany who was not born until the final year of the war in Europe, has neither the same sense of historical guilt nor the same passionate commitment to the Franco-German relationship, and to Europe, as his Catholic Rhineland predecessor, Helmut Kohl. Even before he came to power, Mr Schröder was suggesting a “rapid expansion” of the Franco-German axis into a Franco-German-British triangle. Then, immediately after his election, came all that talk of Germany having become a “normal” country, “which feels neither superior nor inferior to anyone [and which] will not hesitate to defend its own interests”.

The Germans, for their part, complain of a similar absence of European ardour among France’s leaders. And the increasingly open rivalry between the Gaullist president and his Socialist prime minister, Lionel Jospin, in the approach to next year’s presidential elections is making matters worse. It is impossible to know what the French are thinking on anything any more, the Germans grumble. There is no vision, no will. They moan that the French ruling class, largely trained at the elite Ecole Nationale d’Administration, is out of touch with reality, still promoting French national interests at the expense of Europe’s.

In contrast to the close relations between past French and German leaders, there is certainly not much warmth between Mr Schröder and Messrs Chirac and Jospin, despite the forced use of the familiar *tu* and *du*. But what is wrong with today’s Franco-German relationship goes far beyond personalities. It is structural. And that is why some analysts, on both sides, are beginning to suggest that it may not be so easy to put the pieces back together.

Shifts of power

Over the past decade, the whole foundation of the relationship has changed. With unification, Germany, once regarded as an economic giant but a political dwarf, stuck out on the edge of Western Europe, has become a “power factor” at the heart of an expanding Europe. (The phrase is Mr Fischer’s; the Germans hesitate to call themselves a world power, or even a European one.) With the end of supervision by the four occupying powers, Germany has regained its unalloyed sovereignty over its foreign affairs. For the first time in its history, it finds itself surrounded only by friends. A new, post-war generation of leaders is in power who, while never forgetting the horrors of the past, no longer feels the same need to bow and scrape, repeat *mea culpas*, or endlessly cosy up to France.

At the same time, France, once the dominant partner, finds itself confronted by a mightier, more self-confident neighbour with a population and economy a third bigger than its own. Once itself at the hub of Europe, France now sees itself as just another spoke. With the end of the cold war, its self-appointed role as a pivot between the two former superpowers has gone. Its strategic importance as an independent nuclear power has vastly diminished too.

Now, as the EU expands, France is finding it increasingly difficult to shape Europe in its own image. As Hubert Védrine, France’s foreign minister, admitted in a recent book, Europe has ceased to be an

“automatic multiplier of influence” for France. “Today,” he writes, “we are confronted by a system which is more complex, more unstable...where relations are less harmonious, roles less well defined, the results less predictable and less often close to our line.”

It is not easy for a country as vainglorious as France to accept a big shift in its place in the world and, consequently, in its image of itself. Part of the nationalistic bluster about France’s *gloire*, its *rayonnement* (radiating influence) across the globe, its need to preserve its place “at the top table of nations”, is born out of an obsession with its decline as a former colonial power and a growing sense of inferiority, particularly towards Germany, with which it constantly compares itself. France must always be the best, the most intelligent, the most beautiful. “The trouble with the French,” sighs one German diplomat, “is that they need to be kissed at least twice a day, otherwise they feel unloved.”

Although the Germans also stand in awe of much that France has to offer—its culture, its elegance, its gastronomy, its gaiety—they do not feel the same need constantly to engage in beauty contests with the French. But this disconcerts the French all the more. The Germans, they grumble, are always so damned careful to keep their heads down, to keep quiet about their strengths and victories, to avoid appearing too dominating. But surely this modest façade is just hiding a secret sense of superiority, which allows the German eagle to suffer the little French cock to crow? (“Why, for heaven’s sake, did we have to choose such a bird as our national emblem?” a French diplomat moans.)

Of course, the French protest, they have absolutely no qualms about having a bigger, stronger, more assertive neighbour the other side of the Rhine—provided, they add *sotto voce*, the Germans do not use their new power to create a position of dominance in Europe. But that is precisely what some Frenchmen suspect the Germans of seeking to do. Over the past couple of years, a spate of alarmist books and newspaper articles has appeared in France. Alain Griotteray, a former deputy on the centre-right, suggests that “the current greater Germany is only a more peaceful, but no less dangerous, version of the eternal Germany.” Pierre Marion, a former head of the French secret service, goes further, hinting that no nation can easily throw off its history, and talking of “the permanent will of our neighbours to impose their way of life, ideas, manner of running things.” France, he says, “faces being submerged in a developing federal system controlled by the Germans.”

Unleashed desires

Such critics, most over the age of 70, are easily dismissed. Nevertheless, they point to an underlying French apprehension about German political and economic supremacy in Europe. “The fear of Germany is back,” wrote Philippe Delmas, a former aide to France’s ex-foreign minister, Roland Dumas, in a book published shortly after Mr Schröder came to power. (The German edition, though not the French, was called “On the Next War with Germany”.) “Germany is already the greatest political force in Europe. Nothing it can say or do alleviates its neighbour’s anxieties. It threatens despite itself and nowhere more so than in France. The French are convinced that the Germans, like them, are driven by the desire for power. Whatever Germany does fills France with suspicion.”

Behind closed doors, others say the same. At the beginning of the 1990s, Mitterrand sought to subjugate the new bigger Germany by binding it into an ever-more-closely integrated (and preferably French-led) EU. Today, French resistance to the German push towards integration is based at least in part on a fear of German domination in a future federal Europe of perhaps 27 members, including most of the countries in Germany’s traditional “sphere of influence” in Central and Eastern Europe. “France still wants to bind Germany, but without binding itself,” says Karl Lamers, the Christian Democrats’ spokesman on foreign affairs.

The Germans were dismayed last summer when Jean-Pierre Chevènement, then France’s interior minister, accused them of “still dreaming of a Holy Roman Empire of the German nation” after Mr Fischer’s speech outlining his “personal” vision of a federalist Europe. They were even more deeply shocked at last December’s grand EU summit in Nice when, during the row over whether Germany should have more votes than France, Mr Chirac appeared to hint at his own fears of German hegemonic designs. After three German invasions of France in the space of 70 years, reconciliation between the two countries was possible, he insisted, only on the basis of absolute parity.

Post-Nice depression

Believers in the Franco-German partnership are quick to point out that the couple have always had their

ups and downs. The latest spat at Nice was no worse than many others, they insist. But Nice revealed a lot about the state of the marriage. France and Germany seemed to be at loggerheads over almost everything. For the first time, the Germans showed that they were no longer in thrall to the French.

“The Franco-German friendship is neither natural nor automatic,” Mitterrand once said. “It is under constant construction and supported at every moment by a political will.” At Nice, that will appeared to be lacking. A turning-point had been reached. “The game is over,” says Jean-Pierre Froehly, an analyst at the German Society for Foreign Policy, who says he used to be a strong supporter of the Franco-German partnership. “It cannot go on. There are no more converging ideas, no more common visions, no more interest... Ever since 1989, the vaunted Franco-German dialogue has been simply a question of crisis management.”

While not willing to go quite so far, a senior French diplomat admits that the Franco-German couple is sick. “Both the French and the Germans are preoccupied with their own domestic affairs,” he moans:

> Each suspects the other of trying to push its own purely national interests at the expense of Europe. The two wheels of the Franco-German axis are no longer enough to support the heavy tank that Europe has become. More and more people in both Berlin and Paris feel it would be better balanced if there were a third wheel. It is a pity that Britain is not yet ready. I’m sure that Tony Blair is a convinced European. I know that both France and Germany have tried flirting with Britain before. But hitherto it has always been against the other.

Although such views tend to be pooh-poohed in both capitals as unrealistic and, at the same time, shockingly politically incorrect, they are beginning to find an echo in some of the highest French government circles. In Paris these days, Britain’s prime minister is certainly in much better odour than Germany’s chancellor. The same voices which, only two years ago, were insisting that the building of Europe would be paralysed if ever the Franco-German couple split up, can now be heard mentioning the unmentionable. “Of course, it would be better if we could relaunch our partnership, but we [the French] aren’t going to die if we don’t,” says one senior official. “Although things would be more difficult, Europe would not cease to function.”

In the aftermath of Nice, Messrs Chirac and Schröder have ordered their foreign ministers to conduct a thorough review of all the issues dividing the two sides. Everything is supposed to be settled before the next Franco-German summit in June. The lines between Paris and Berlin are buzzing as never before. Weekly video-conferences between senior civil servants have been set up. Mr Védrine and Mr Fischer are meeting for talks in person once a month. Their respective bosses have agreed to get together with their foreign ministers for an informal dinner at least once every six to eight weeks. Both sides have promised to give a new boost to the Franco-German motor as Europe’s driving force.

But have the two drifted too far apart to come back together again? No, says Mr Lamers. “There can be no European Union without a union between France and Germany. We are complementary. If we can thrash out a solution, then it becomes a kind of model on which all the others can reach agreement.” Michael Steiner, Mr Schröder’s foreign-policy adviser, refers to a certain “indefinable mystique”, unlike that existing between any other two EU states.

One German diplomat thinks Nice has even made things better, because the Germans are no longer trying to operate from a position of inferiority. “The French”, he says, “are not used to us not being submissive. We must now be very careful and patient with them. But it’s so much easier to do when you’re feeling self-assured.”

The ties that bind

Although there is much that separates the two countries, there is also much that binds them, not least their geography. Germany and France are also mainland Europe’s two biggest economies. Both are members of the euro zone. They are each other’s main trading partner. They share a common culture and, willy-nilly, a common history: no fewer than 23 wars against one another over four centuries, according to Mr Delmas’s estimates. Although tourism between the two countries remains scarce, the two peoples learn about one another through some 150,000 educational exchanges every year and the official “twinnings” of more than 4,000 towns and villages. And despite the increasing dominance of the English language, a quarter of German secondary-school pupils and around a fifth of those in France continue to learn each other’s tongue at least as a second foreign language. According to the opinion polls, each country now regards the other as its closest friend and staunchest European ally. That is an

astonishing achievement.

The predominant feeling in both countries is still that the Franco-German marriage will survive. Both sides have too much to lose if it does not. Officials maintain that the gap between the partners on many European issues is not as unbridgeable as it sometimes seems. And Mr Schröder, who gaily confessed to knowing nothing about foreign affairs when he came to power, has recently surprised everyone with his new keen interest in, and knowledge of, Europe. “He’s so committed,” said one normally cynical French analyst after a recent meeting with the German chancellor. “I was very impressed. It is this, above all, that has reassured me about the future of the couple.”

Nothing is yet assured, however. As Nice showed, a great deal has changed in this marriage, not least the balance of power inside it. Partnerships can be patched up, of course, and partners can rub along while disagreeing. But it would be foolish to think that the Franco-German *ménage* can go back to being what it was.

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Politics amid the palms

Mar 22nd 2001 | LOS ANGELES
From The Economist print edition

AP

The fragmented and depressing mayor's race in Los Angeles offers few solutions to the city's problems

RUSSELL CROWE is not the only person whose future will shortly be decided by voters in Los Angeles. But the chances of an Oscar for the star of "Gladiator" seem to have generated far more debate than the prospect of a new mayor. Richard Riordan, the current mayor, must step down after serving his limit of two terms. He will leave a city more sure of itself than when he took office eight years ago, but still dissatisfied with its schools, its police force and its traffic—and largely uninterested in politics.

Los Angeles has issues aplenty: an imminent Latino majority in the city, police scandals, a looming Hollywood strike, the secession of the San Fernando Valley from the rest of the city, some of the worst schools in the country, and its first electricity blackout this week. Yet none of the candidates in the April 10th election seems to have grabbed the attention of voters in the way that Mr Riordan, a wealthy Republican businessman, did in 1993. Of the 24 candidates running, six have a shot at victory, and no one is likely to get a clear majority. This will ensure a run-off between the top two candidates on June 5th. Angelenos are distinctly unenthused by this. Only 30% of those who can vote, will.

One candidate in the run-off will almost certainly be James Hahn. Mr Hahn, a Democrat, led the pack in a recent poll by the *Los Angeles Times*, with 24% of likely voters saying they planned to vote for him, double the share for any of the other candidates. He has the advantage of a widely recognised name and a loyal following among blacks. Both came thanks to his late father, Kenneth Hahn, a county supervisor for 40 years, who delivered a steady flow of parks, hospitals, and emergency services to his constituents.

His son first won office as a city controller, and he is now city attorney. Term limits (which are taking effect for the first time in this election) have forced him to look beyond this job. Mr Hahn has achievements of his own to point to, including tackling gangs, and pursuing polluters and tobacco firms. But being an insider has a downside, too. After being involved for so long, Mr Hahn is not as free to criticise the city's shortcomings as some of his rivals are. The recent scandal inside the Rampart division of the Los Angeles Police Department, for example, cuts both ways. Mr Hahn has won praise for negotiating a "consent decree" under which the federal government would assume some control over the LAPD. But his office was slow to respond to allegations against the officer at the heart of the scandal, who later confessed to intimidation and murder.

Among Mr Hahn's five leading rivals, none can credibly be called an outsider. Two hold city posts, two come from jobs in Sacramento, the state capital, and one is a congressman in Washington for a district in Los Angeles.

Symptomatically, the loudest critic of the status quo is the candidate with the longest involvement in LA politics. Joel Wachs first ran for mayor in 1973, and has been a member of the city council for 30 years. He has started populist battles against developers over tax subsidies for a downtown sports stadium, against the city utility over electricity rates for the old and against landlords over rent. His critics say he is more interested in stirring things up than solving them. But he is popular with gay and Jewish voters and in the (largely white) San Fernando Valley, where 40% of Angelenos live.

Mr Wachs, originally a Republican, is running as an independent. He may lose votes to the only official Republican in the race, Steven Soboroff, who is a protégé of Mr Riordan. A successful property-developer, he was called in by the mayor in 1993 to help build a railway line between the harbour and downtown. Mr Soboroff then became LA's parks commissioner, which put him in charge of school playgrounds and thus into a succession of battles with LA's overwhelmed school system. As mayor, he promises more of his brisk businessman's approach.

If her performance in the televised debates counted for anything, Kathleen Connell might have her chance. But fewer people watch such things than go to Spago's Oscars party. As state controller (she is another victim of term limits) she has been a contentious figure, even picking a fight with her fellow Democrat Governor Gray Davis over the electricity crisis. But she lacks a solid LA base, and trails the pack.

Mr Hahn's most likely rival in the run-off is another figure from Sacramento, Antonio Villaraigosa. The best known Latino in an increasingly Latino city, he is running neck-and-neck with Mr Soboroff, with 12% support in a recent *Los Angeles Times* poll. Mr Villaraigosa used to be speaker of the state assembly, but he has been back in his home town campaigning for almost a year, competing with Mr Hahn for endorsements from environmentalists, women's groups and, especially, unions (all of whom tend to vote). He also has the blessing of Mr Davis.

Mr Villaraigosa's campaign is complicated, however, by the presence in the race of another Latino candidate, Xavier Becerra, a representative for the 30th congressional district, who shares an office building with him. Well-regarded within the national Democratic Party but less well known in Los Angeles, Mr Becerra is actually the most popular candidate with Latino voters (with about 30% of their vote). That ought to make a big difference, but won't: despite making up 45% of the city, Latinos will probably cast only 20% of the votes.

And then what?

If Los Angeles represents the future of America—and it often does—then the mayor's race should scare the whole country. A group of career politicians is paying court to a clutch of local interest groups, largely ignoring the bigger issues facing the city; most potential voters are ignoring the whole business; there is a feeling that local government cannot really do anything, and a sense that politics lags demographics. Even if Mr Villaraigosa wins, the electorate will be far whiter, richer and older than the city as a whole.

One irony of this process is that, even if the candidates can escape such issues during the campaign, whoever becomes mayor will need to tackle them head on. One immediate challenge will be whether to reappoint Bernard Parks, the chief of police. Mr Wachs, who has said he would not, is the only candidate not to fudge this question. Another problem is what to do about the city's currently independent school board. All the candidates have waffled about increasing its accountability; nobody seems willing to follow the example of Chicago and to put it under the mayor's control.

Then there is secession. Discontent about those schools and the distribution of city construction projects has spawned separatists not just in the San Fernando Valley, but also in Hollywood and the area around the harbour. No candidate has yet made a firm statement about secession. Opposition would alienate those precious votes in the Valley; support would drive away public-sector unions. Each candidate has chosen his or her own mealy-mouthed formula to put off the issue until after the election. One of them will have to come clean.

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Science policy

A problem at Fission Control

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From The Economist print edition

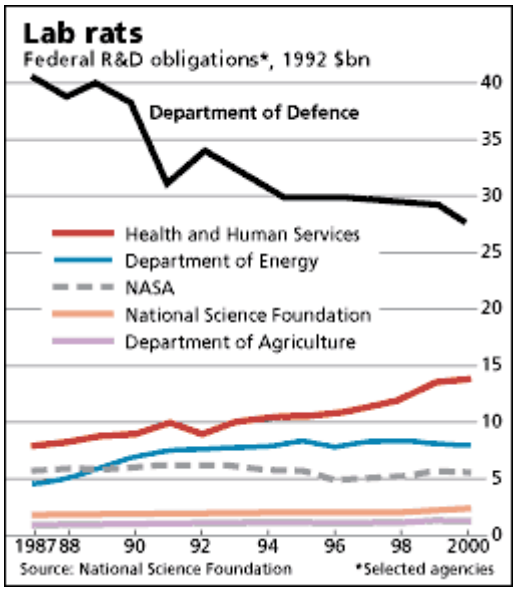
GEORGE BUSH is a great admirer of missile-defence systems. And Dick Cheney is something of a living tribute to the miracles of modern medicine. Those two facts, argue some aggrieved scientists and Silicon Valley types, provide the only logical explanations for why the administration is pouring money into defence and biomedical research, while holding back on cash for the physical sciences and engineering. And to add insult to injury, Mr Bush has not yet picked a science team, so there is nobody to hear their howls.

Most of the grumbles from the business community remain fairly tactful. And the scientists are worried about antagonising their new masters. But the private mutterings are getting louder. "It is well past time for this administration to turn the lights on," argues Donald Kennedy, a former president of Stanford University, in the latest *Science* (which he edits).

Mr Bush's blueprint proposes that the National Institutes of Health (NIH) receives a record $2.8 billion, or 13%, increase in 2002. That would keep the NIH budget on its way to doubling between 1998 and 2003. A similar sum would be added to the Department of Defence (DOD) budget, though much of this money may go straight towards developing the proposed national missile defence system, rather than towards basic R&D efforts.

Meanwhile, funding for other federal agencies concerned with science will remain flat, or even decline. In real terms, the budget of the National Science Foundation (NSF), which supports basic research across all the sciences, would drop by 2%. The non-defence R&D spending of the Department of Energy (DOE) could slump by as much as 7%.

To be fair, the general trend over the past decade has been towards giving more money to medicine (see chart). But the budgets of the NSF and the DOE are up by 13% and 12% respectively in 2001. And physical scientists were hoping to catch up. This week, a group of scientists meeting at Johns Hopkins University reiterated the need for America to start building a new particle collider, to compete with Europe.



Part of the scientists' case is that bankrolling the NIH at the expense of the NSF is counter-productive, because the biomedical sciences have drawn heavily on advances in physics, chemistry and information science. Harold Varmus, a former head of the NIH and a Nobel laureate in medicine, cites magnetic-resonance imaging as one example of a technology straight out of physics that has nonetheless transformed modern medical practice. Allen Bromley, who was President George Bush senior's science adviser, argues that medical breakthroughs will dry up "in a few years" if the blueprint is approved as it stands today.

An added fear is the longer-term effect on America's talent pool. As decades of data on enrolment can confirm, students tend to follow the money. Graduate enrolment in engineering programmes is down 15% in the past decade; biologists have been multiplying like rabbits. In 1999, the NSF accounted for only about 15% of total federal financing for academic R&D, while the NIH paid for about 58%. If that figure slips further, even fewer PhDs will choose the physical sciences.

This may please Genentech and Merck; but it worries Intel, Boeing, and IBM, which already have to hire many electrical-engineering and computer-science graduates from places like India (a cheaper source, to be sure, but one that also requires green cards or visas). David Peyton of the National Association of Manufacturers says the effects on the workforce should be visible "within two years". John Crowley, who

looks after federal relations at the Massachusetts Institute of Technology, talks about America being “utterly dependent on foreign countries to sustain high-technology enterprise”.

There is talk in Congress of reviving a bill that would push more money towards the NSF and the DOE, perhaps even doubling their funds over the next few years. Sherwood Boehlert, the chairman of the House of Representatives Science Committee, is said to look favourably on that idea. If that were to happen, it would not be at the cost of Mr Bush’s commitment to the biomedical sciences (though it would hardly help his attempts to rein in federal spending).

Science seems to be the only area where Mr Bush risks being out-administered by the famously sluggish Bill Clinton. Mr Bush has yet to appoint a White House science adviser, a post that the technology-friendly Mr Clinton had filled by Christmas eve. Mr Bush’s most significant “scientific” decision—reversing a campaign pledge to curb carbon-dioxide emissions, after complaints from the energy industry—did not involve any scientists at all, though it seemed to annoy plenty of them.

Of course, Mr Bush’s stock is fairly high among the biomedical scientists. Greater popularity still depends on his decision on whether to continue giving federal money to stem-cell research that uses embryos (and is opposed by the anti-abortion lobby). Mr Bush has put that one off to the summer. Certainly, he does not have many friends in laboratories at the moment. But he might also reflect that getting on with scientists never did Al Gore much good.

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Tremble, Coca-Cola, tremble

Mar 22nd 2001 | LITTLE ROCK
From The Economist print edition

SOMETHING strange has been happening in Little Rock. Women from around the South have been descending on Arkansas's state capital and making their way to the Wycoff Coffee House. The reason is Niagara—a blue fizzy Swedish tonic, for which the Wycoff's owner, Lari Williams, is the sole American distributor. After two weeks without a shipment, 1,000 bottles of the potion arrived in Little Rock on Monday morning. By noon, fewer than 500 remained. By Tuesday lunchtime, it had all gone.

It is not unusual for Mrs Williams to find a line of frenzied Southern belles lined up outside the glass door of the Wycoff to buy the herbal drink. But demand has spread well beyond modern-day Scarlett O'Haras. Women from all over America have jammed the coffee house's phone lines begging for the six-ounce bottles of blue. One man rings from Florida, offering Mrs Williams $1,000 for a bottle, which normally sells for $4.50. Another customer drives three hours to find a Niagara-less coffee house. Both are placed on the list of orders for the next shipment.

Niagara's marketing pitch is simple: "Romance in a bottle". The drink, made with South American herbs, reportedly possesses an erotic recipe to make women's—and some men's—libidos soar to new heights. Most of Mrs Williams's callers claim to have evidence that this is true. Certainly word of mouth is driving her business—and Niagara is beginning to appear on southern radio stations. Next week, Mrs Williams is expecting a shipment of 300,000 bottles, to be sold at her own coffee house and through other stores; and she expects to raise her order to 600,000 a month as demand spreads.

Niagara, which is made by Nordic Drinks in Stockholm, has not been particularly successful in Europe. Mrs Williams and her husband, Roger, discovered the drink in Texas, where it was also not doing well. The ladies of Little Rock, though, have lapped up the sixpack of love—just as Mrs Williams expected.

Even leaving aside the exploits of any former residents named Bill, Arkansas's state capital has always had a slightly steamy side. It is the home of *Swinger* magazine, and also one of the top markets for sex toys in the country. But there are standards to be set.

Just as religious types never say hello to each other in liquor shops, some Arkansans like to avoid eye contact as they pick up their Niagara. One Little Rock socialite orders a cappuccino, whilst giving Mrs Williams a discreet wink. Two bottles of the love potion are put down at her table in a plain brown shopping bag.

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Lexington

The blame game begins

Mar 22nd 2001
From The Economist print edition

IN WASHINGTON, DC, it is never too early to start claiming credit or apportioning blame. Under Bill Clinton, the Democrats said that they had built “a new economy” long before the numbers hinted that one might actually exist. Now the two parties are blaming one another for a recession that hasn’t arrived yet.

Despite Wall Street’s recent travails, American national income was still rising by just over 1% a year at the last count. Retail sales are still rising. The economy is generating 35,000 jobs a week—more than during the last year of Bill Clinton’s term. A hard landing, perhaps: not a recession yet. But the political battle over “the R-word” is already three months old.

In December, even before the election result, Dick Cheney talked about an economy “on the verge of recession”. George Bush followed this up by arguing that his proposed $1.6 trillion tax cut was needed because the economy was “stumbling” and “stuttering”. The Republican plan is obvious: exaggerate the bad news, get it out as early as possible, blame it on Mr Clinton, build support for Mr Bush’s huge tax cut—and then give the tax cut, and Mr Bush, credit for the future upturn.

For their part, the Democrats are just as cynically distorting the problem in order to blame Mr Bush for the (alleged) recession and stockmarket crash. “The Bush administration has been talking down the economy for some time,” says Tom Daschle, the Democratic leader in the Senate, “and we’re beginning to see the results in the stockmarket.”

It hardly needs saying, but both these positions are caricatures. The sudden slump in the Dow came after profit warnings from large companies (not Mr Bush); the longer-term decline both in the market and in output began last spring. Mr Bush’s argument that the state of the economic cycle justifies his tax cut is just as bogus. The tax cut will do almost nothing for this year’s consumer spending (because the proposed cuts come into effect later). Even if Congress were ultimately to backdate some of the tax relief to the start of 2001, taxpayers might get only perhaps $10 billion, which counts for almost nothing (or 0.1%, to be exact) in a $10 trillion economy.

The “who lost the economy?” debate might be written off as just another political game. But it matters, not least because it raises early questions about Mr Bush’s economic team.

The speed of (over)reaction is itself significant. In the past, policymakers and markets tended to wake up to a recession only after it had started. The fact that, this time, they are arguing about whose fault it is before the event is, in a backhanded way, a tribute to the genuineness of the “information revolution”. In principle, this might be a good thing, if it meant economic policy is adjusted early (often corrections are too little, too late). But there is a flip side. In a world where information is so important, confidence is itself a valuable commodity, so it is vital that politicians do not exaggerate just to score political points. Unfortunately, Mr Bush’s team is doing just that.

The recent unemployment figures contained some of the best news the economy has had in a while: the acceleration in job creation was a sign the economy was not in recession yet and might—hope of hopes—be bottoming out. That was not what Mr Bush wanted to hear in the middle of his attempt to sell his tax cut. Hence his reaction that the numbers showed the economy to be sputtering. This week, the normally sensible energy secretary, Spencer Abraham, made the preposterous claim that America faced the sort of energy problems last seen in the 1970s, when there was petrol rationing. For good measure, he added

that the “last three recessions have all been tied to rising energy prices.”

There is circumstantial evidence that accentuating the negative may be hurting consumer confidence. In January, after Messrs Bush and Cheney sounded off, the index of consumer confidence took its largest monthly fall since 1990. This was all the odder because retail spending itself remained relatively buoyant. Mr Bush may be influencing consumers’ beliefs, if not their behaviour. There is a risk that such rhetoric may turn a necessary correction into an unnecessary slump.

This insouciance—even recklessness—towards the market consequences of what you say is worrying both in its own right and because it may be part of a trend. Earlier this year, Paul O’Neill, the treasury secretary, told a German newspaper that the strong dollar was not a product of government policy. He meant that it had come about as a result of strong economic performance, but the markets took his comment as a sign that the administration was planning to abandon Mr Clinton’s strong-dollar policy and the dollar crashed. Mr O’Neill had to apologise the next day.

Foot-in-mouth disease is often a problem for new finance ministers. But there are signs that Mr Bush’s finance team combines inexperience, particularly in international economics, with fundamentally incompatible views. Larry Lindsey, the president’s chief economic adviser, said Japan should stop trying to use big deficit spending to pull itself out of slump. Bob Zoellick, the trade representative, pointedly distanced himself from this dubious prescription. Mr Zoellick is the only member of Mr Bush’s top economic advisers with any real experience in international economics. But his appointment has set off a frenzy of bureaucratic infighting to minimise his influence.

The contrast with the previous administration could hardly be greater. Whatever his other faults, Mr Clinton chose his economic advisers well. Robert Rubin, as treasury secretary for most of his presidency, and Larry Summers, Mr Rubin’s deputy and eventual successor, saw eye-to-eye with each other and with Alan Greenspan. They also commanded the respect of Wall Street, the international capital markets and Congress. That cannot be said for Mr O’Neill and Mr Lindsey.

It is early days yet. But the signs of inconsistency and exaggeration are dismaying. When investors behave like this, they mark down the shares of their own companies. When politicians do it, they can mark down the whole economy.

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Spies like them

Mar 22nd 2001 | MOSCOW AND WASHINGTON, DC
From The Economist print edition

SIX Russian diplomats to leave at once, and around 50 more asked to go soon. The State Department's move on March 21st is not just a response to the arrest last month of Robert Hanssen, the senior FBI agent accused of spying for the Russians since 1985. Not since Ronald Reagan threw out 55 Russians in 1986, during the Cold War, has the American government taken such a robust stance.

It contrasts sharply with the Clinton administration's reaction to an even bigger scandal: the arrest of Aldrich Ames, a senior CIA officer, for spying in 1994. That led only to the symbolic expulsion of the Russian *rezident* (chief spy) in Washington. The Bush administration has chosen to be a lot tougher.

One reason is FBI impatience with the number of Russian spies in America. After dropping to around 100 in the mid-1990s, the figure is now about 200. The current kerfuffle provided a perfect opportunity to clean house. Only the six diplomats facing immediate expulsion were directly involved in the Hanssen affair.

In recent weeks the defence secretary, Donald Rumsfeld, has accused the Russians of spreading weapons to rogue nations (though he didn't use that term), while his deputy, Paul Wolfowitz, said the Russians "seem to be willing to sell anything to anyone for money"—a comment greeted with outrage in Moscow.

The Bush administration is also taking a harder symbolic line on Chechnya, where a guerrilla war has been dragging on for years. Marc Grossman, who is in line to become a senior State Department official, said at his confirmation hearings this week that he planned to meet Ilyas Akhmadov, the "foreign minister" of the Chechen government. Previously, such contacts have been very low-key. President Vladimir Putin's staff described this as "absolutely unacceptable".

The practical question now is how many American diplomats will be expelled from Moscow: six, 45, or perhaps even more.

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American extraterritoriality

Whose rules count?

Mar 22nd 2001 | WASHINGTON, DC
From The Economist print edition

The *Greeneville* inquiry also raises questions of military accountability

"I AM fully responsible for this truly tragic accident and for the rest of my life I will live with the horrible consequences of my action." Thus Scott Waddle, commander of the *USS Greeneville*, who testified this week before a military inquiry in Honolulu, Hawaii, which is trying to find out why his submarine hit a Japanese trawler on February 9th. The *Ehime Maru* sank in minutes, drowning nine people on board including four children.

Mr Waddle's surprising testimony could be used against him in a court-martial. The submarine was packed with civilian guests, who were treated to an "emergency ballast tank blow"—forcing water from the ballast tanks to send the submarine surging to the surface. It was an unnecessary exercise and a rushed one—and, despite a cursory check for nearby craft, Mr Waddle missed the Japanese ship. He also admitted letting a trainee sonar operator work without supervision.

At the very least, the Pentagon will come under pressure to make its training procedures safer. America's armed forces have had a bad run of deadly training accidents. In 1998 a Marine Corps jet, which was practising jamming radar signals in Italy, killed 20 skiers when it sliced through a cable holding up their gondola. In April 1999 an F-18 jet in Vieques, Puerto Rico, bombed an observation tower during an exercise on a firing range, killing one local man. And on March 12th, a navy jet killed five American soldiers and a New Zealander when it bombed their observation post on a range in Kuwait.

The pilot of the jet in Italy, Captain Richard Ashby, did face a court-martial and a long sentence. But he was acquitted on charges of involuntary manslaughter and negligent homicide. After a fuss about whether he had hidden a videotape filmed from the plane during the accident, Mr Ashby was convicted only of obstructing justice, and served less than six months in an American prison.

In Puerto Rico, local people reacted furiously to the accidental bombing. Protesters occupied the range and told the navy to stop its exercises. An inquiry by the navy satisfied nobody on Vieques, where a referendum on expelling the forces is due in November. In contrast, although an inquiry into the Kuwait bombing has already been set up, "it won't bother the authorities because Kuwait is not a democracy and no locals were hurt," says retired Colonel Dan Smith of the Centre for Defence Information, a sceptical think-tank in Washington, DC.

Of all these accidents, the one involving the *USS Greeneville* is perhaps the most sensitive because of already testy relations between America's armed forces and Japan. (Japanese opposition to the almost 30,000 American servicemen on the island of Okinawa has grown since a Japanese court convicted three soldiers of raping a girl there in 1995.) Although the accident happened in American waters, the navy was quick to involve its ally, inviting a Japanese admiral to join three American admirals as a non-voting member of the inquiry team.

Such foreign involvement in an inquiry into a military mishap is unusual. But public opinion in countries that play host to American military bases is beginning to count. The United States may increasingly have to live with the prospect of non-American authorities becoming involved when its troops are accused of wrongdoing in far-flung parts of the world.

The "status of forces" agreements, which the United States has concluded with 53 countries, are intended to protect its troops from prosecution when they commit crimes against other Americans, or in the course of their duties. But some sensitive test-cases could arise if the United States sticks by Bill Clinton's commitment to join an international criminal court. The ICC is likely to come into existence late next year and will deal with war crimes. Although none of the recent peacetime incidents would possibly qualify as a war crime, the principle on which the court's jurisdiction is based is an important one.

Under the ICC rules, countries will be safe from prosecution by the court if, and only if, they are seen to be conducting their own investigations into alleged atrocities by their troops. In the words of Ken Roth of Human Rights Watch, a New York-based lobby group: “Ideally the United States will always scrutinise itself. The ICC is [only] a backstop, a necessary one for when countries fail.”

But what if America’s armed forces were accused of failing to investigate their own misdeeds in a convincing way? In 1993, for example, the Red Cross alleged that American soldiers killed 500 civilians in Somalia. Unlike Canada, Belgium and Italy, which investigated ill-treatment of Somalis by their soldiers, America did not hold its soldiers to public account. Should that happen in the future, America might find itself hauled before the ICC.

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The wedding waltz

Mar 22nd 2001 | WASHINGTON, DC, AND WESTON, VERMONT
From The Economist print edition

"IN EVERY civil-rights campaign you take three steps forward, then two steps back," laments David Elliot of the National Gay and Lesbian Task Force. Vermont last year took a long stride forward when it gave gays the chance to have a civil union, which confers the same legal rights as a marriage. It was the first, and so far is the only, state to do so. But now there is a shuffling retreat.

AP

Here comes the grooms

The state's lower house last week voted by 84 to 15 to outlaw marriage between couples of the same sex, and so raised eyebrows elsewhere. When progressive Vermont seems to backtrack on gay-rights, surely the prospects for civil unions in the rest of America look even more shaky?

In fact, many Vermonters were more concerned this week about the terrible storms and snow that have made it impossible to tap their maple trees. And in any case, last week's vote will probably have no legal effect. Republicans, who have campaigned to "take back Vermont" since the law on civil unions was passed last April, dominate the Vermont House, but not the Senate. And their bill is unlikely to pass there. This bill was simply "pay-back time" for Republican voters, says Sam Lloyd, a long-serving Democratic legislator, adding that it was a "meaningless, mean-spirited waste of time".

A partisan point, to be sure. But a special review commission, made up of local politicians and human-rights workers, generally pronounced the civil unions a success in January. Six months after the new law came into force in July, 1,527 civil unions had been conducted. Women were fonder of weddings: they accounted for roughly two-thirds of the civil unions. All ages were involved: the average was 41 years, though an 82-year-old also tied the knot with his partner.

By and large, they have also gone pretty smoothly. A few hotels have refused to host same-sex wedding parties, and a newspaper was accused of refusing to include same-sex marriage announcements. But town clerks have co-operated with the paperwork, tax offices have ensured that gay couples are treated like straight ones, insurance companies have been told not to discriminate. And tourism may have benefited. Almost four-fifths of those tying the knot were from out of state.

On the other hand, there is plainly some unease. The Republicans' success in last November's elections, when they took the state House for the first time in 16 years, reflected public anxiety about the issue, especially among rural folk. (Vermont is still a largely rural place, which made the civil-unions law seem all the more surprising.) Ruth Dwyer, who stood as the Republican candidate for governor last year, warns that societies which "fool around" with the basic structure of the nuclear family are sure to come to grief. Look at ancient Rome, she says. The American Family Association moans that "we are gradually losing our moral base in America."

In fact, the moral base seems to be doing quite well in politics. Although six more states—California, Connecticut, Hawaii, Rhode Island, New York and Washington—are considering bills to allow same-sex marriages of some sort, the reverse trend is stronger. Four years ago, Bill Clinton signed the Defence of Marriage Act, limiting the federal definition of marriage to that between a man and a woman. So far 35 states have adopted laws to prohibit recognition of same-sex unions, and more are expected to follow suit. Another 13 states retain laws that prohibit sodomy outright, and five more ban sodomy between members of the same sex.

Overall, change may come from other quarters. "If you go back to the struggle for interracial marriages, that started in faith communities, not with some big legal decision," argues Eric Ferrero of the American Civil Liberties Union. And the position of religious groups is slowly shifting. On March 14th, for example, Presbyterian clergy agreed to allow blessings of gay couples at marriage-like ceremonies, and last year the Central Conference of American Rabbis voted to let rabbis officiate at such occasions too. Such steps down the aisle may be harder to reverse than legal ones.

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Boeing and Seattle

The big bird flies

Mar 22nd 2001 | SEATTLE
From The Economist print edition

DESPITE the arrival of Microsoft, Amazon and Starbucks, Seattle is inextricably linked with one company: Boeing. With 80,000 employees in the area and one of the best-known names in the world (to Seattle, Coca-Cola is merely a giveaway refreshment on a 747), Boeing has given the city an economic engine and civic identity.

So the announcement on March 21st by Boeing's boss, Phil Condit, that the company was moving its corporate headquarters out of the city, was a shock far more vicious than the real earthquake three weeks ago. Boeing will move to Denver, Chicago or the Dallas-Fort Worth region in the autumn, taking only half its 1,000 executive staff with it. The fact that Mr Condit made this announcement 2,800 miles away, in Washington, DC, only added insult to injury.

Mr Condit claims the move is a logical extension of his push to make Boeing a company that does more than "bend metal"—build aircraft. Most of its 198,000 staff work nowhere near Seattle. Re-locating the headquarters will put company leaders in closer touch with customers, other Boeing divisions, and Wall Street. And it also wants a site with global access, cultural diversity and an educated workforce.

All of which smacks faintly of eyewash. For a global company such as Boeing, Seattle is no further away from its customers than anywhere else. The truth is that, like an old marriage, Boeing and Seattle have gradually fallen out over the past decade. Boeing's merger with McDonnell-Douglas in 1997 brought new managers to Seattle, who have been openly contemptuous of the company's local traditions and the premium placed on keeping "Boeing man" happy. A 40-day strike by its elite engineers a year ago may have been the final straw.

Boeing recently announced that it would sub-contract wing production of its new stretch-version 747X—the most complex component of an aircraft—to Mitsubishi Industries in Japan. The move brought sharp protests from its engineers. But clearly Boeing would like to do more sub-contracting—and do so free of local ties to its production sites and workers.

Both Gary Locke, the state's governor, and Paul Schell, Seattle's mayor, are already scrambling to avoid the tag "the man who lost Boeing". Some of Seattle's more leftish politicians were sympathetic to protesters at the November 1999 meeting of the World Trade Organisation. The city has been unable to reach any solution to its traffic mess. And Washington state raises its taxes almost exclusively from businesses, which may have hurt Boeing (despite the numerous exemptions it collected for itself).

Even if Boeing is leaving now, Seattle has much to thank it for. Without it, the city would not have its concert halls, theatres and excellent schools. In fact, it might today be no more than a mid-sized seaport with a spectacular view of Mount Rainier.

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Over to you, Cavallo

Mar 22nd 2001 | BUENOS AIRES
From The Economist print edition

Can Argentina's most charismatic and controversial economist end the country's recession?

Get article background

Reuters

BARELY into his second year of governing Argentina, Fernando de la Rua now stands at the centre of an impressive scene of political destruction. The Alliance coalition with which he came to power is in tatters. He has been obliged, in effect, to outsource the government. On March 20th, he changed his economy minister for the second time this month, bringing in Domingo Cavallo, who held the job for five years under Carlos Menem, Mr de la Rua's Peronist predecessor.

Mr Cavallo's task is to try to haul Argentina out of a recession that has now lasted 33 months, while staving off a debt default and saving the currency-board scheme he introduced in 1991, which pegs the peso at par to the dollar. If Mr Cavallo, who now heads a small conservative party, is successful, he would become a strong candidate for Mr de la Rua's job in the presidential election due in 2003. If he fails, Argentina's prospects will be sombre.

He has lost no time. On March 21st, he unveiled his plan, though the details were sketchy. He will ask Congress for sweeping powers to write a "competitiveness law", which will include changes in taxes and import tariffs, reform of the state bureaucracy and of labour laws, and (unspecified) cuts in public spending and jobs.

The immediate aim is to trim the fiscal deficit by some $3 billion. That would enable Argentina to meet the deficit target of $6.5 billion for this year agreed on with the IMF in January, as part of an accord worth almost $40 billion in loans and credit guarantees. Over half the cut in the deficit may come from a new tax of up to 0.6% on financial transactions. A similar tax in Brazil has cut the evasion of other taxes.

But Mr Cavallo also wants to stimulate growth, by cutting (or allowing exemptions to) some taxes that inhibit investment. He would cut import tariffs on capital goods—but raise tariffs on consumer goods. This would require a change to the rules of the Mercosur trade group. He may also decide to ask for extra help from the IMF.

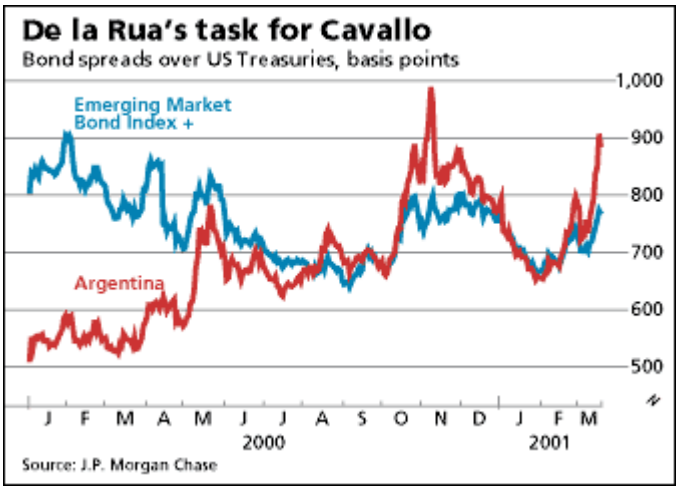
Mr Cavallo is an unlikely saviour, charismatic but controversial. His temper is notoriously short. He is despised by many in Mr de la Rua's Radical party, who accuse him of helping to foment the economic turmoil that hastened the exit in 1989 of the party's last president, Raul Alfonsin. Neither does Frepaso, the Alliance's smaller, leftish, component, look on him more kindly. It criticises the social cost of Mr Cavallo's free-market economic reforms of the 1990s.

But there was little alternative to his appointment. Mr de la Rua's first economy minister, Jose Luis Machinea, had tried a gradualist approach. But the economy remained depressed, unemployment rose to 15%, and investors became nervous. On March 4th, Mr Machinea was replaced by Ricardo Lopez Murphy, the Radicals' leading free-market economist.

Mr Lopez Murphy unveiled a plan involving $4.5 billion of budget cuts over two years. Bankers applauded, but neither Mr Lopez nor the president had done their political homework. Half the cuts were to be in education. That prompted three ministers and six senior officials to resign; two had been appointed only four days earlier. Their going brought down Mr Lopez.

Mr Cavallo has little time. Argentina's political turmoil has gone hand-in-hand with rising panic in the financial markets. The yield on its bonds has soared, driving up borrowing costs (see chart); for the first

time since 1995, Argentines have been rushing to withdraw their money from banks.



Mr Cavallo insists that the fixed exchange rate will stay. In presenting his "competitiveness" plan, he harked back to the Convertibility Law setting up the currency board, which he pushed through almost exactly a decade ago.

But if he is to succeed, he will require political support denied to Mr Lopez Murphy. Mr de la Rua called for a government of national unity—but that is not what he has got. Mr Cavallo has brought several of his friends into the cabinet. But Mr de la Rua vetoed the return to government of Carlos Alvarez, Frepaso's leader, who resigned as vice-president in October. Though the social-development ministry remains unfilled, there is no cabinet post for any of Mr Alvarez's colleagues in Frepaso. Absent, too, were not only the Peronist opposition, but any representative of Mr Alfonsin's wing of the Radical party.

Mr de la Rua has become "a king, who reigns but does not govern," says Ricardo Rouvier, a pollster. In his latest poll, Mr de la Rua's popularity has slipped to just 26%, down from 32% last month. But 48% of those surveyed approved of Mr Cavallo's appointment.

Mr Cavallo's first battle involves his request for emergency powers from Congress. The Alliance has only 120 seats out of 257 in the lower house, and the Peronists control the Senate. The Peronists have said they will oppose the powers, but they may be won over. Several Frepaso deputies have already said they will defect from the government, though their absence will be offset by the 12 deputies of Mr Cavallo's own party.

After some footdragging from Congress, Mr Cavallo may get his powers. His plan includes some populist touches—such as the increase in import tariffs. And it is widely seen as a last chance to maintain stability in Argentina. But with a congressional election due in October, few politicians are likely to do Mr Cavallo any lasting favours.

Mr Cavallo almost certainly represents Mr de la Rua's last chance, too. Failure would probably precipitate an early presidential election. Even so, the currency board might survive. Almost two-thirds of personal loans and 93% of government debt are already in foreign currencies, according to Abel Viglione, an economist at FIEL, Mr Lopez Murphy's think-tank. But further political turmoil would drive interest rates further up, making a debt default all but inevitable. "If spending continues to exceed income, someone in Argentina will have to pay," says Mr Viglione. If the president and the opposition let him, Mr Cavallo's job is to decide who. If they do not, the whole country may end up the poorer.

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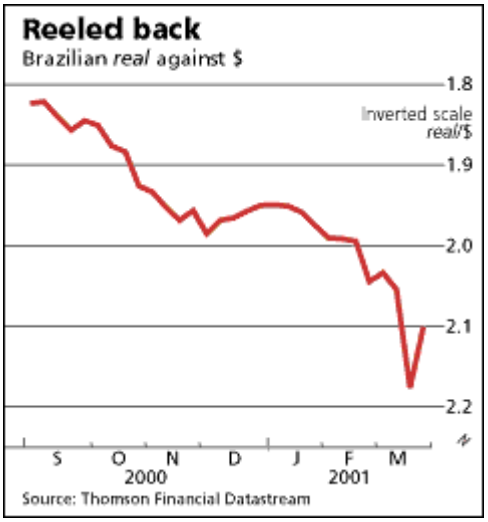
Safety first for Brazil's economy

Mar 22nd 2001 | SAO PAULO
From The Economist print edition

AFTER two years of relative stability, Brazil's currency, the *real*, has slid sharply this month. On March 19th, it plunged to 2.18 against the dollar, its lowest level since the aftermath of the country's chaotic devaluation of January 1999 (see chart). Having already failed to halt the slide by selling dollars, the Central Bank responded by first selling dollar-indexed bonds and then by raising interest rates by a half point, to 15.75%—the first increase since March 1999.

Why all the jitters? Partly nerves about Argentina. But unlike its neighbour's, Brazil's economy is growing strongly. And despite some recent internal squabbling, its government is much stronger too.



In fact, the *real*'s weakness is a textbook example of the advantages of a floating exchange rate. Economic growth has sucked in imports. Brazil's trade deficit so far this year is already almost equal to the $700m deficit for the whole of 2000. To make matters worse, a giant oil offshore platform exploded last week, killing ten workers, and then sank; that could add up to $600m to this year's bill for oil imports. In addition, there are fears that an American recession might staunch the flow of foreign investment that has financed the current-account deficit.

So a slightly weaker currency, boosting exports, is just what Brazil needs. But floating exchange rates also have disadvantages. The Central Bank insists it does not have a target for the currency, but it does have an inflation target (of 4% for this year), and imports will now be more expensive. By raising rates, against market expectations, the bank has shown it takes that target seriously.

Businessmen and politicians will not be happy. That may not help Arminio Fraga, the bank's president, in his efforts to persuade Congress to approve a bill giving the bank independence. Mr Fraga's job may become more challenging in the next few months. But these are problems Argentina would love to have.

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Canada

At loggerheads

Mar 22nd 2001 | VANCOUVER
From The Economist print edition

A long-running trade battle is about to resume

FOR almost 20 years, Canada and the United States have been at war over softwood lumber. Next week, they are about to join battle again. And this time, rather than settling for a draw, Canada may play to win.

The Americans claim Canadian producers are subsidised, and so have demanded countervailing duties on their exports, which are worth C$11 billion a year ($7 billion). Canada retorts that it merely has a different system, and the Americans are indulging in plain old-fashioned protectionism.

So far, the Americans have not been able to prove their charges, despite carrying out three investigations. In 1992, the Commerce Department concluded that Canada was guilty of subsidies and that duties were justified. But a dispute-settlement panel, set up under the United States-Canada Free-Trade Agreement, threw out that finding.

Even so, in the interests of avoiding the duties, the Canadian industry sued for formal peace in 1996. Under the United States-Canada Softwood Lumber Agreement (SLA), Canada's duty-free exports were capped at 14.7 billion board-feet. British Columbia, Quebec, Ontario and Alberta, and companies within those provinces, were given export quotas: if they exceeded them, they would face "border fees" (fines, in other words) of $50 to $146 per 1,000 board-feet.

This agreement, which expires on March 31st, has not satisfied the Americans. The Coalition for Fair Lumber Imports, representing most American producers, points out that in the United States 95% of the timber is privately-owned and sold at auction. In Canada, by contrast, the provinces own about 94% of the timber. They set harvest levels, restrict the export of raw logs and, says the American lobby, sell their timber at "administratively-set prices" that are about a quarter of market-based prices in the United States. As a result, American mills cannot compete and are "shutting down in droves".

Canada does not deny that government plays a big part in its softwood-lumber industry. But it points out that companies have to pay government-set stumpage rates to harvest public forests under long-term licences. American complaints about subsidy, they say, ignore the extra expenses Canadian forest companies must meet for planning, road-building, replanting and environmental protection.

Contrary to the claims of American lobbyists, the Canadian industry has had a hard time over the past five years, closing mills, cutting jobs and racking up losses. If Canada had rejected the SLA and simply maintained its share of the American market (about 33%), there would have been gains, according to one study, of C$700m and 11,000 jobs.

From this costly experience, Canada's lumber industry has learned not to negotiate with America's Congress any more. As one Canadian trade specialist puts it, "Anybody who thinks the American trade-law process has any semblance to fairness is naive."

Three faint-hearted forestry managers this week called for talks, but most of the industry, backed by the provinces and the federal government, is preparing to go to law to get free trade in lumber. The Canadians will seek adjudication under the North American Free-Trade Agreement (NAFTA) and, if necessary, go to the World Trade Organisation. Canada "doesn't want a new trade-restricting agreement," says John Manley, the foreign minister.

Mr Manley points out that Canada now has some allies in the United States on the issue. American firms, such as Weyerhaeuser, have bought Canadian rivals. A recent study by the Cato Institute, a libertarian think-tank, found that the SLA had jacked up lumber prices in the United States by about $50-80 per 1,000 board-feet and had added $800-$1,300 to the cost of a new house. An alliance of 15 groups

representing builders, consumers and contractors, is now pushing for free trade in lumber; 49 members of the House of Representatives have introduced a resolution backing the idea.

This new round in the battle is going to be long, messy and costly. But as the SLA's opponents on both sides of the border can testify, the proper conclusion is obvious: rules-based free trade.

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Venezuela

Noisy neighbours

Mar 22nd 2001 | CARACAS
From The Economist print edition

RELATIONS between Colombia and Venezuela have never been straightforward. The two countries share much trade and investment, and a 2,000km (1,250-mile) border. But they also have a dispute about territorial waters. And since Hugo Chavez, a nationalist former officer, became Venezuela's president in 1999, Colombia's government has become deeply suspicious of its neighbour's intentions.

It fears that Mr Chavez's "neutrality" towards its internal war is a figleaf for a tacit alliance with the leftist guerrillas of the FARC and the ELN. Echoing the words of his hero, Simon Bolivar, the Venezuelan-born independence leader who also freed Colombia, Mr Chavez has complained that the "rancid oligarchy in Bogota" is out to get him.

In December, Colombia withdrew its ambassador for several weeks, after two FARC guerrillas were invited to address a group of Venezuelan parliamentarians. After that, Mr Chavez seemed to become more conciliatory, proclaiming the "eternal brotherhood" of the two neighbours.

Now, another row has broken out over Jose Maria Ballestas, an ELN member accused of a 1999 hijacking, in which a Colombian aircraft with 41 passengers was flown to Venezuela. Arrested in February in an operation involving police from both countries, he was suddenly released, after officials intervened, just minutes before he was to be handed to Colombian police and deported.

When the story broke in mid-March, embarrassed Venezuelan ministers lamely accused the Colombian police of violating Venezuela's sovereignty. The head of Venezuela's judicial police was sacked, apparently as a scapegoat. Colombia was outraged. Officials ordered Mr Ballestas's arrest on charges of possessing forged Venezuelan papers. Colombia wants his extradition.

Last weekend, Mr Chavez presided over military manoeuvres in the disputed Gulf of Venezuela, just metres from the border. Squeezing his bulky frame into a tank, the Venezuelan leader warned any "insolent" intruder that he would be met with force. "I fear the president may have a war with Colombia in mind," said Francisco Arias Cardenas, who staged a coup with Mr Chavez in 1992 before running against him in last year's presidential election. Now, Mr Chavez has said he will meet Andres Pastrana, Colombia's president. He seems to enjoy being the neighbour from hell.

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Peru

Grave

Mar 22nd 2001 | LIMA
From The Economist print edition

Get article background

YELLOW plastic police tape wrapped around makeshift wooden crosses marked out one pauper's grave among the thousands that dot the desert hills of the vast municipal cemetery of Villa Maria del Triunfo, where the outskirts of Peru's capital peter out into the sand. In April 1997, police hastily dumped there the body of Nestor Cerpa, the leader of the Tupac Amaru Revolutionary Movement, who for four months had held 72 hostages in the Japanese ambassador's residence in Lima.

Cerpa died in a commando operation ordered by Alberto Fujimori, Peru's now disgraced president, which freed all but one of the hostages alive. Celebrated by Mr Fujimori as a personal triumph, that operation, in which all the rebels died, may now come to haunt him.

Earlier this month, in the presence of a prosecutor, workers broke open Cerpa's grave, and exhumed the body. The investigation was prompted by a claim by one of the hostages, a former Japanese official, that he saw three of the guerrillas alive after they had been overpowered by commandos; one was allegedly escorted, hands tied behind his back, through a tunnel dug for the rescue from a nearby house.

Mr Fujimori, who was stripped of the presidency in November, is now living in Japan. Both he and Vladimiro Montesinos, his fugitive intelligence adviser, are under investigation by prosecutors in Peru, on suspicion of racketeering. Ronald Gamarra, the prosecutor investigating the deaths of the rebels at the residence, now wants both men to be charged with murder. Unlike some previous attempts to link them to acts of brutality, the embassy rescue is not covered by a 1995 amnesty law. Mr Gamarra now plans to visit Japan to interview witnesses.

For Peruvians, who suffered a decade of terrorist violence, the case is sensitive. Only one other former hostage has backed the allegations (though he was not an eyewitness). Even if forensic evidence supports the claims, prosecutors are unlikely to charge the commandos, who are heroes to the army.

Mr Fujimori has now taken Japanese nationality, and Japan has shown no sign that it is prepared to extradite him to Peru. But nowadays human-rights crimes can be pursued anywhere, as General Augusto Pinochet of Chile knows to his cost. If charges are filed, "at the very least, Fujimori will not be able to leave Japan and the Japanese will have a serious problem," says Mr Gamarrra. Mr Fujimori may argue that, if the rebels were indeed killed in cold blood, he was not responsible. But at the time he boasted publicly that he and Mr Montesinos had been in command of the operation.

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India's corruption blues

Mar 22nd 2001 | DELHI
From The Economist print edition

Though it may well survive the latest corruption scandal, the authority of the leading party in the government is badly dented

FATALISM is ever present in India, and the government in Delhi seems to be hoping that a popular belief in the inevitability of corruption will help it survive the biggest scandal of recent times. That hope seems well founded. But whether the government will regain the authority it needs to pursue its two main initiatives—economic reform and peace in Kashmir—is much more doubtful.

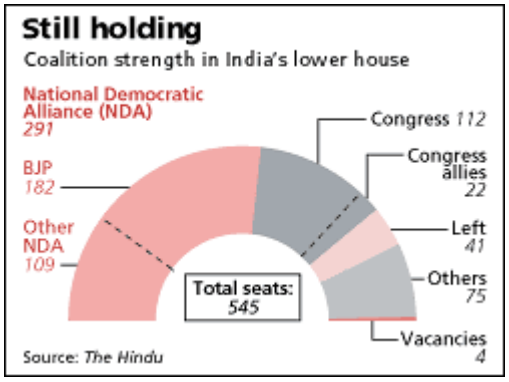
The uproar over the release of videotapes last week showing top politicians and officials taking bribes from two Internet news reporters posing as arms dealers has reached a noisy impasse. The defence minister, George Fernandes, has resigned, though he remains "convener" of the 18-party ruling National Democratic Alliance. The NDA has lost one member, the Trinamul Congress party of West Bengal, but remains sure enough of its majority to dare the opposition to bring a no-confidence vote in Parliament. The opposition, equally sure of its minority, has declined. Instead, it has blocked parliamentary proceedings for a week, relenting long enough only to allow money to be voted for the state to continue functioning.

Both sides have converted an occasion for shame into one for self-righteousness. Sonia Gandhi, leader of a suddenly alert Congress party, vowed at its plenary meeting in Bangalore to "wage every war" to "ensure that this country is liberated from the shackles of this corrupt, shameful and communal government". But she herself was wounded when her own personal assistant came under investigation in a separate scandal. The prime minister, Atal Bihari Vajpayee, has blended penitence with defensiveness. He has promised a judicial probe into the allegations, and a clean-up. But, in a television address on March 16th, Mr Vajpayee reserved the word "criminal" to describe the hurling of allegations, not the behaviour alleged.

It is true that tehelka.com, the enterprising website that armed its reporters with cash and spy cameras, used surreptitious means to persuade a variety of officials, generals and politicians to accept a total of 1.1m rupees (about $24,000) in bribes and gifts. It is also true that some of the most serious allegations made against Mr Fernandes and Brajesh Mishra, the prime minister's top aide, among others, are unsubstantiated gossip. But they have concentrated discussion on how many more heads will roll and when.

The real import of the tapes is the evidence they give that corruption is the norm, not the exception, at every level of public life. This does not surprise Indians, who are expected to bribe everyone, starting with traffic policemen. India is beset by what some call a crisis of governance, which compromises nearly every public service, from defence to the distribution of subsidised food to the generation of electricity. Tehelka.com has simply rubbed Indians' faces in it.

Politicians, in honest moments, admit this. Kapil Sibal, a prominent member of Congress, says “the system is thoroughly corrupt.” Pramod Mahajan, the minister of information technology and a member of Mr Vajpayee’s Bharatiya Janata Party (BJP), thinks the voters face a choice “not between good and bad. It is between bad and worse.”



With turpitude so common, removing one group of parties from power would not solve the problem. Given a chance to fight political corruption, Parliament usually ducks it. It now wants to shear the Central Vigilance Commission, the main body implementing anti-corruption law, of its role overseeing investigations of politicians.

The problem begins, says N. Vittal, the central vigilance commissioner, with the 40% of the economy that is unaccounted for. Indian democracy runs on this murky money. The total cost of a campaign for a parliamentary election has been estimated at 20 billion rupees (around $430m), which is often paid for by undeclared donations of the sort proffered by tehelka.com. Reformers such as Mr Vittal want such donations to be declared and made tax deductible. Some also want the Election Commission to give the voters information about candidates’ criminal backgrounds, as Delhi’s High Court has directed. But that reform may also be stopped: the government has appealed against the decision. No one in power seems to back the promised cleansing.

Mr Vajpayee’s immediate concern is the fate of his closest advisers, widely resented for accumulating power in the prime minister’s office at the expense of other ministries. On March 19th, Mr Mishra and N.K. Singh, his top economic adviser, called a press conference to defend themselves against claims that they had improperly influenced decisions on deals in telecoms, power and, in Mr Mishra’s case, defence equipment. Pressure for their dismissal, from some of Mr Vajpayee’s best friends, is mounting. A fiercely right-wing ally of the BJP, the Shiv Sena, is calling for their heads. And although the Rashtriya Swayamsevak Sangh (Association of National Volunteers), ideological big brother to the BJP, has withdrawn its calls for their removal, it has done so only for fear of destabilising the government.

The departure of Mr Mishra and Mr Singh would probably blunt the government’s drive for economic reform. Even if they stay, Mr Vajpayee will have trouble enacting the most controversial but valuable elements of the reforms announced along with the budget last month. These include privatisation and making labour law more flexible. The labour reform requires the approval of Parliament’s upper house, where the government lacks a majority. The crisis may also strengthen the home ministry, thought to be more reluctant than the prime minister’s advisers to make gestures to separatists in Kashmir. If Mr Vajpayee survives the tehelka scandal, he may begin to ask himself what, exactly, he is in power for.

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Business pains in Vietnam

Mar 22nd 2001 | DANANG
From The Economist print edition

IF YOU go to Cong's pavement café in Danang, you may have to hang on tightly to your seat. The police, you see, come by almost every other day to enforce their ban against street cafés—by taking whatever furniture they can lay their hands on. When Mr Cong sees them coming, he simply throws all his plastic chairs and tables into the river, which runs alongside. Later he jumps in to retrieve them. "The police are afraid to go in," he laughs. Mr Cong is getting good at the furniture toss: last month he lost only eight chairs.

Such is business life in Vietnam. For many, being unmolested is still too much to hope for. In a regional survey released this week, the country managed to top Indonesia as the most corrupt in Asia. But as the state continues to reduce its role in the economy, people are gaining more latitude to do as they please, even in areas far removed from the hustle and bustle around Ho Chi Minh City. One change that has made this possible is a new enterprise law passed last year that makes it far easier for Vietnamese companies to register and get licences to do business.

Boosters claim the Communist Party genuinely wants to loosen its hold and point to all the new firms that have been signed up under the law. Some of that activity is no doubt exaggerated. At a craft shop in Hoi An, another central Vietnamese coastal town about 30km (19 miles) from Danang, the manager says that his shop has been carving furniture for export since 1993. But only last month local officials came by to say that the shop was actually an enterprise, and needed to be registered. Because private enterprise has been slowly gaining ground since the first wave of reforms, called *doi moi*, in 1986, it is hard to gauge how many "new" companies are being created in this way.

Nevertheless, the role of the state in economic life is being gradually rolled back. One of the most commonly cited statistics about Vietnam is the gap between the 1.4m jobs the country will need to create every year and the 1.1m it is generating at present. Differences of opinion among the leadership about liberalisation remain, but the commitment to the private sector seems firm.

Vietnam opened a stockmarket in Ho Chi Minh City last year, even if it is kept on a tight leash. The country has negotiated a trade deal with the United States, which should be ratified this year. It has already merged or privatised thousands of state-owned firms, though most are minnows. Despite all this, Vietnam will remain a poor, gradually improving, mainly rural country for the foreseeable future. But if the private sector continues to grab a hold, even the police will eventually find something better to do. There is a rumour that they have opened their own café in Danang. They may not know much about business, but by now they have plenty of chairs.

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Emily MacFarquhar

Mar 22nd 2001
From The Economist print edition

Jeffrey MacMillan/USN&WR

WHEN, in 1964, Emily Cohen chose to go home to the United States via India, after a year studying Chinese in Taiwan, she could scarcely have imagined that it would lead, indirectly, to over 20 years working on *The Economist*. The more immediate, more enduring and, it should be said, more important consequence was that she found in India Roderick MacFarquhar. A British journalist, he was covering the funeral of Jawaharlal Nehru for the BBC, though he was already known chiefly as a China specialist. Before long Emily had become his assistant at *China Quarterly*, of which he was the founding editor, and in due course his wife. She died on Sunday, of a brain tumour.

The chance encounter on Nehru's lawn thus brought Emily to London and, on January 1st 1966, to a job on *The Economist*. Before long she had established herself as one of the most perceptive writers about China. Whether decoding from afar the official utterances in Beijing—the country was in the throes of the cultural revolution and largely closed to journalists at that time—or, later, reporting directly from China itself, Emily interpreted events with an acute eye and a sharp pen. When China opened up, she was able to interview many of its leaders, providing insights that others had missed. She was, for instance, the first journalist to appreciate, and describe—in *US News and World Report*, for which she was then working—the significance of Deng Xiaoping's intervention in the negotiations with Britain over Hong Kong.

China was not her only interest. She also wrote penetratingly about other Asian countries, notably India and Pakistan. Indeed, one of the casualties of her illness was a planned biography of Benazir Bhutto. For three years in the 1980s she also wrote—with her habitual verve—about the United States. A New Yorker by birth, she had reached middle age without feeling the need to learn to drive. Accordingly, reporting expeditions from Cambridge, Massachusetts, where her marriage to Rod had by now deposited her, had to be carried out by public transport. It was not unusual for her to turn up in New England towns by Greyhound bus.

Emily's prose was lean and elegant. So was her appearance. Her personality, however, was open, spontaneous and exuberant. She will be remembered, at least by her colleagues, above all for what seemed to be the electrical field around her of energy, noise and fun.

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China

Touchpaper

Mar 22nd 2001 | BEIJING
From The Economist print edition

AT LEAST 108 people were killed on March 16th in a series of four bomb blasts that tore through the Chinese city of Shijiazhuang, a few hours' drive south-west of China's capital. Gruesome in their own right, the bombings were also an acute political embarrassment. They occurred just 12 hours after the prime minister, Zhu Rongji, had made a solemn, and rare, apology on television for another deadly blast earlier in March. That had been an explosion in a school in a poor village in Jiangxi province that killed 42 people, mostly children.

Immediately after that explosion, Mr Zhu himself announced the findings of Jiangxi provincial investigators, who said a disgruntled villager nicknamed "Psycho" had blown up the school. But newspapers, in China as well as abroad, reported the claims of many local residents that children had for years been forced to make fireworks during school hours. A Chinese foreign-ministry spokesman berated reporters for doubting the official "Psycho" explanation, but in a press conference two days later, Mr Zhu revealed that he himself had been sceptical. He had sent a team of investigators in plainclothes to the village. The team found that children had indeed been made to assemble fireworks in the past, and was now seeking the true cause of the explosion.

Although the death tolls in the Jiangxi and Shijiazhuang incidents are among the highest known in recent years, the sad fact is that explosions, both malicious and accidental, are a common occurrence in China. On March 17th, two children in Anhui province were killed in yet another fireworks explosion. Widely used and poorly regulated, explosives are about as easy to obtain in China as handguns are in the United States. They are used not just by fireworks makers, but also by builders, miners and even by peasants, who find a well-placed charge to be the easiest way to get rid of a stubborn tree stump. Six bank robbers, also in Jiangxi, were convicted of using explosives last November to rob a bank and were executed for the crime on March 16th.

Especially alarming, explosives are sometimes used by the most vengeful among those in China nursing grudges of one sort or another. Jilted lovers, laid-off workers and put-upon minorities have all resorted to bombings to vent their rage. Numerous bombings in China's western Xinjiang region have been attributed in recent years to indigenous Uighur terrorists who oppose Chinese rule over the region. Uighur extremists claimed responsibility for an explosion on a bus in the heart of Beijing four years ago.

Neither the culprit nor the motive is yet known in the Shijiazhuang bombing. Officials have launched a hunt, complete with an offer of a hefty reward, for a suspect called Jin Ruchao, aged 40. He was convicted of rape ten years ago and the police want to question him about the murder in February of his girlfriend. Mr Jin is known to have links with people in each of the bombed buildings. But there are doubts that a man acting alone could have been responsible for such a complex multiple bombing. One building, a five-storey dormitory at a cotton mill, was totally destroyed, suggesting that the bomber must have been someone with considerable expertise.

A textile centre long past its prime, Shijiazhuang is home to thousands of laid-off workers and has seen its fair share of tension in recent years as economic reforms have worn away the social safety-net. All this makes it easy to believe that workers, angry at being sacked, may have been behind the blast. It is also possible that the explosions were a violent protest against authority triggered by a series of corruption scandals in the Shijiazhuang city government. With Mr Zhu's new-found resolve, the government will no doubt discover the cause of the blast, if not how to prevent another. Anger over layoffs and corruption is as abundant and easy to find in China as explosives.

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Australia

In full swing

Mar 22nd 2001 | SYDNEY
From The Economist print edition

THERE was no disguising John Howard's concern as he left the prime minister's residence in Canberra on March 18th. He was digesting the result of a by-election in Queensland that saw a swing of almost 10% against the Liberals, the conservative party he leads. This was no run-of-the-mill by-election. Voters in the seat of Ryan, encompassing an affluent part of Brisbane, have never returned anyone other than a Liberal, by solid margins, since the seat was created 52 years ago. This time, the Labor candidate, Bob Tucker, took just over half the vote.

AP

A pucker for Tucker

The Liberal Party's survival in this, its heartland, was still uncertain several days later, and likely to be decided by the distribution of preference votes from small parties and independents. The unfortunate result followed two state elections, in Queensland and Western Australia, which Labor had won convincingly. Labor needs a national swing of just 1% to take control of the federal government in Canberra. With a general election due this year, and a string of electoral debacles hanging over him, Mr Howard is up against it.

One thing that seems to have turned against Mr Howard's government is its claim to superior economic management. For a time that seemed true. After the Liberals and their coalition partner, the National Party, came to power in 1996, they continued the process of structural reform that the former Labor government had started. Mr Howard introduced a new tax system, with a long-overdue consumption tax on goods and services. His government turned Labor budget deficits into surpluses. Australia boomed, even as the economies of its Asian trading partners slumped in the late 1990s, leading Mr Howard to boast that Australia was the "strong man of Asia".

But the good times have stopped rolling. The economy contracted by 0.6% in the last quarter of 2000, the first quarter of negative growth in ten years. The forecast growth rate for this year has been almost halved, to 2.1%. Australians had barely absorbed this news when the Australian dollar fell below 50 cents against its American counterpart for the first time on March 14th. It may not have bothered exporters, but it was a blow to national pride.

Mr Howard's response was implicitly to blame the central bank for the economic downturn, describing as an "error of judgment" its decision last August to raise interest rates (it has recently lowered them again, twice). But Mr Howard's lauded new sales tax has played its part too. A building boom to beat the tax's introduction last July was promptly followed by a slump. The new tax system, and particularly the costs of complying with it, has also proved deeply unpopular among, of all people, Mr Howard's core supporters, small businessmen.

Australia may have difficulty bouncing back when Japan and the United States, its two biggest trading partners, are slowing down. This is not a good climate for a prime minister seeking a third term. Indeed, Mr Howard's reversal of political fortune has been accompanied by a rise in the opinion polls of the Labor Party and Kim Beazley, its leader, whose economic plans are still unclear. Mr Howard has recently tried to curry favour with the voters by, among other things, cutting the tax on fuel, something he said he would never do.

Few people are willing to write Mr Howard off yet. He is a seasoned fighter and has come back from the political dead more than once. He scraped back to a second term in 1998 when the coalition won a majority of seats with a minority of the popular vote. Doing so again, though, may not be so easy.

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The Philippines

A woman's work

Mar 22nd 2001 | MANILA
From The Economist print edition

EPA

WHEN they booted out Joseph Estrada through street demonstrations two months ago, middle-class Filipinos were hoping to avoid an economic catastrophe. As she settles into office, the early signs are that Gloria Macagapal Arroyo, Mr Estrada's successor, is indeed managing to restore a bit of stability. But the Philippines' economy was a perennial under-achiever even before Mr Estrada sent it into a tailspin last year. Mrs Arroyo has thus inherited a testing job at a particularly testing time.

Two simple economic indicators suggest that confidence is returning. One is the currency, which at 48.45 pesos to the dollar has now rebounded 13% from the depths to which it sank under Mr Estrada. Even more significant, perhaps, was a mild rebound in imports in January. Since the Philippines relies heavily on exports of electronics, especially to the United States, a drop in imported inputs of components translates into falling exports within a few months. A sharp drop in imports during the second half of 2000, as Mr Estrada's scandals engulfed him, was considered especially alarming. Although imports are still running below their level a year ago, the mild rebound suggests that the change of president has at least made things better.

There are other signs, too, of a rebound in confidence. In a quarterly poll of foreign businessmen last week by Peter Wallace, a Manila-based consultant, 91% said that they expected either steady improvements or better under Mrs Arroyo, and 71% said that their opinion of her had improved in the two months she had run the country. Such assessments can change quickly, of course; but without the initial confidence of investors, the new president's job would be much more difficult.

Nevertheless, it will still be a difficult year for Mrs Arroyo, who must cope with sharply falling demand from the United States, a runaway budget deficit, and the prospect of a poor harvest towards the end of this year. To make matters worse, she is going to be preoccupied for the next two months with mid-term elections for both houses of the Philippine Congress.

She will have to campaign hard to ensure that her allies win them. It was Mr Estrada's majority in the Senate that allowed him to short-circuit the impeachment process, in the process setting off the protests that brought him down. If Mrs Arroyo cannot win control of the Senate, it will be a sharp blow to her legitimacy. This is already shaky, given the way she came to power, in the process by-passing the constitution.

In the meantime, her government is concentrating on the most pressing economic problem: the budget. Mr Estrada's government somehow managed to run up a deficit last year of 136 billion pesos (about $2.8 billion), more than twice the budgeted shortfall. Faced with a collapsing revenue base and some inherited obligations, the new government is hoping for a shortfall in 2001 of no more than 145 billion pesos. Yet though most of the Philippines' problems stem from its feeble tax-collection system, Mrs Arroyo has tried to tame the deficit by launching an austerity programme. This has allowed her to hit her targets in January and February, but starving the economy may not bring long-term success.

Mrs Arroyo's greatest asset—both during the current slowdown and in the longer term—will be her potential ability to set off an investment-led boom. She was trained as an economist and believes in the benefits of globalisation. She knows her way

around government, having served as a development and welfare minister, and she was an active member of the Senate. If Mrs Arroyo is to capitalise on this experience, she must attend to the most vocal complaint of investors, foreign and local: the pitiful state of infrastructure in the Philippines. In the 14 years that Mr Wallace has been polling his clients, they have consistently listed this as their main complaint, topped only briefly by cronyism under Mr Estrada.

The best way to win these investors over would be to convince them that long-promised plans to finish roads, ports, railways and other projects would be speeded up, rather than delayed. For years, the maps trotted out for investors have shown far too many dashed and dotted lines, rather than the solid ones they long to see. An investor in the Subic Bay economic zone, a converted former American naval base, reckons that although 80% of the transport and telecoms links to the area are finished, that is enough to attract only 10-20% of potential investors. Finish the projects, he says, and not only will the existing businesses be able to expand, but new ones will come flooding in.

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Turkey

New man, new hope?

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From The Economist print edition

With a new man in charge of its economy, Turkey is trying to clear up its chaos

A MONTH after Turkey was rocked by the worst financial crisis in its recent history, the rickety three-party government of Bulent Ecevit is at last taking steps to restore confidence. More exactly, his new economy minister, Kemal Dervis, is.

A respected economist who was plucked from the World Bank in Washington earlier this month to sort out the mess, Mr Dervis has been given wide powers, including control of the Central Bank, the treasury and the new banking regulatory board. This week he outlined an ambitious recovery programme.

Its heart is a radical shake-up of the banks, long seen as the root of Turkey's financial ills. The chief culprits, three state banks much milked by crooked politicians and with combined losses estimated at $20 billion, are to be placed under a joint administration led by technocrats. The long-delayed sale of debt-laden state companies will be speeded up. First to go will be a 51% stake in Turk Telekom, the lucrative land-line monopoly. Holdings in the national airline and the sugar and tobacco monopolies are meant to follow.

Meanwhile, the cabinet has issued a long and detailed list of the reforms it says it will set afoot to meet the European Union's conditions for membership. Though it promises to reform the justice system, on such hot topics as Cyprus, Kurdish language rights and the generals' intervention in politics, it offers unabashed fudge. Yet for the government to produce the document at all, amid the financial turmoil, is a welcome sign that the forces opposed to EU membership were unable to use the crisis to delay its publication.

So far, so good. Now comes the hard part: finding money to pay for the economic reforms, which are inextricably linked with steps to improve democracy. Mr Dervis flew to Washington to meet the World Bank, the IMF and the Bush administration this week. All have said there will be no money until the government starts doing the things it says it will do, and gives Mr Dervis unfettered support. Their scepticism is justified.

The economic crisis began after Mr Ecevit had a row with President Ahmet Necdet Sezer and burst out of a National Security Council meeting saying there was a political crisis. Within minutes Istanbul's stockmarket had plunged, interest rates shot up and foreign investors were rushing for the door. The government had to abandon control of the lira, one mainstay of a now defunct disinflationary plan agreed on with the IMF.

The currency duly shed over a third of its value, and inflation, which fell by more than half last year, is now set to rise to an annual 50%, while the economy shrinks by 2%. Yet Mr Ecevit has not sacked a single minister, not even those against whom allegations of corruption prompted his row with the president. Indeed he has not even shuffled any ministerial portfolios. Instead, he blames the IMF and its "outdated techniques" for Turkey's economic woes.

But will he whirl?

The deeper worry of western governments and institutions is that, for all his nominal powers, Mr Dervis does not have the government's full backing. Indeed Mr Ecevit's coalition partners are eager to trip him up. Mesut Yilmaz, leader of the centre-right Motherland party, has refused to relinquish control over privatisation. Devlet Bahceli, leader of the ultra-nationalist wing of the coalition, has stepped up calls for Mr Dervis to join Mr Ecevit's Democratic Left party so that he can be "brought under party discipline". Mr Dervis has refused.

The politicians may well be unnerved by Mr Dervis's soaring popularity, which is matched only by that of the president, another political outsider. Some commentators already bill him as a future prime minister. But let him beware. Several generations back, his ancestor, Halil Hamid Pasha, was appointed by Sultan Abdul Hamid I to fix the Ottoman empire's finances. When he failed, he was executed in public and his head preserved in a gourd of honey.

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Charlemagne

Silvio Berlusconi, Italy's would-be Napoleon

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From The Economist print edition

SOME Italians think Silvio Berlusconi is an angel persecuted by left-wing magistrates, unfairly despised by the political establishment, cold-shouldered by a snooty liberal intelligentsia. Others label him a crook who was lucky to survive the expulsion of his old-guard political sponsors from public life, whose first fortune was shadily acquired, and whose good luck in politics stems largely from his ownership of half of Italy's television channels and to the sparkling image that has afforded him. Neither picture offers the full story. But few Italians know who he really is.

As leader of the opposition centre-right's coalition, now called the House of Freedoms, Mr Berlusconi, at 64, is tipped to win the general election on May 13th. Small, bronzed and balding, he oozes ambition and chutzpah, fancying himself as a kind of entrepreneurial, modern-day Napoleon, cutting a swathe across Europe. He may well be Italy's richest man.

Mr Berlusconi's father was a Milanese bank clerk. Young Silvio took a law degree with a thesis on advertising contracts, but more exotic fields soon beckoned. Among other jobs taken by the future tycoon was one as a cruise-ship crooner, accompanied by his pal Fedele Confalonieri at the piano. Loyalty is a Berlusconi feature: his old ivory-tinkling friend now runs his Mediaset empire, embracing all those television stations.

Mr Berlusconi's first big business passion was *il mattone*—brick, or property. In the late 1960s he spotted that go-ahead Milanese were fed up with living in a crowded, smoggy city, so he borrowed the cash to build Milano 2, a leafy American-style suburb on the eastern outskirts. Its houses sold like a dream. His opponents still mutter about where he got the money from and how he persuaded the local authorities to give him permission to build. An immense fortune was his.

As he widened his scope, he continued to draw inspiration from America. Italian television was dull—and under tight political control. Mr Berlusconi reckoned that commercial television was due. He bought his first station in 1974. Within years he was challenging the state monopoly. But he needed some political muscle. He found it with Bettino Craxi, an up-and-coming Milanese who was trying to lure the Socialist Party towards the market—and subsequently became prime minister. When Mr Berlusconi started to air recorded programmes simultaneously on different television stations round the country, giving the illusion that he already had a national network, local judges tried to stop him but the government in Rome overruled them.

Mr Berlusconi got richer still. With cash from television and advertising, he bought publishing houses, film-production companies, supermarkets. The old business establishment looked on with surprise and suspicion. He was determined to get the better of it. The Fiat-owning Agnellis owned Turin's mighty Juventus football team; well, he would buy AC Milan. They owned a national newspaper, *La Stampa*; so he took control of *il Giornale*. Carlo De Benedetti, the owner of the giant Olivetti company, was famous for putting politicians in his thrall; Mr Berlusconi was soon out-schmoozing him. Many Italians revelled in the outsider's success, others frowned, everyone noticed. The little *Cavaliere* (a title the state bestows on worthy entrepreneurs) was galloping ahead.

The turning-point came in 1993. The end of the cold war, the breaking of the post-war taboo against letting communists (many now refashioned as social democrats) into government, and the collapse of the long-dominant Christian Democrats and Socialists in a welter of corruption scandals opened up a vacuum at the heart of Italian politics. Egged on by Giuliano Urbani, a political scientist who has provided some of

what might be called the tycoon's ideology, Mr Berlusconi invented a party called Forza Italia (Let's go, Italy), the national football cheer. Within months he had forged a coalition with the post-fascist National Alliance and the federalist Northern League. In the spring of 1994 he became prime minister, having beaten the ex-communist-led left in a general election.

No matter that he lasted barely eight months in the job, lost to a new combination of the centre-left in 1996 and has since been caught up in a tangle of legal cases which he blames on left-wing magistrates out to do him down. No matter that he has thrice been convicted of tax fiddling and other kinds of fraud (though acquitted on appeal). No matter that he is still chastised, as an aspiring national leader, for failing to resolve a manifest conflict of interests.

Indeed, when last week a journalist was given half an hour on state television to fling the most shocking allegations of criminality at him, his poll ratings merely moved up. People in government, rather than demanding a judicial re-examination, merely defended the state channel's right to air the rumours. In sum, Mr Berlusconi looks well set to beat the left led by Francesco Rutelli, a competent and affable former mayor of Rome.

Has *il Cavaliere* changed, since his last brief joust in office? Yes, in that Forza Italia is more like a party, less like a football team. Yes, in that it has clearer if simplistic plans: for lower taxes, tougher treatment of criminals and illegal immigrants, and lots of spending on infrastructure. Not really, if you look at *il Cavaliere*'s persona.

His ego is as big as ever. "I am the best leader in the world," he recently quipped. He still hates being heckled, questioned, or interrupted except by cheers. He remains reluctant to delegate power or to change the make-up of his inner circle. In 1994, he dished out jobs to some dubious characters. His latest team is better qualified, with a respected would-be finance minister in Giulio Tremonti. But the boss still insists on including as candidates three old pals who are under criminal investigation.

The left has solid achievements to its name (notably Italy's entry into the euro), but it is out of puff. The mood is for change. Italians, it seems, want a more dashing leader. Whether Mr Berlusconi will prove a responsible or honourable one is a big gamble. But enough of his compatriots seem willing to take it.

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France

The voters face both ways

Mar 22nd 2001 | PARIS
From The Economist print edition

In France's local elections, the left took Paris and Lyons. But most of the country swung slightly to the right

"PARIS goes left...France goes right." The headline screaming from the front page of the capital's main tabloid reduced France's two rounds of local elections, on March 11th and 18th, to their essence. Paris fell to the left for the first time since the ill-fated commune of 1871. So too Lyons, France's third-biggest city, traditionally another conservative bastion. Good news for the left, and its leader, the prime minister, Lionel Jospin, hoping next spring to seize the presidency while holding on to the National Assembly. But not good at all elsewhere.

AP

Delanoë celebrates his storming of the capital's town hall

Of the 583 towns with populations above 15,000, the right now controls 318 towns, a net gain of 40. Indeed, overall just over half of the popular vote, even in Paris, whose mayor is elected by its councillors, not directly, went to the right. Wonderful news, on the face of it, for President Jacques Chirac, anxious not just for a second term but for a parliament that would free him from the constraints of the "cohabitation" he has endured since 1997.

Yet how can either man crow victory? The fact is that France, for all the robust health of its economy and its perennial desire on the world stage to punch above its weight, is in a political dither. Just two years after electing him, the voters used the early parliamentary elections rashly called by Mr Chirac to force him into cohabitation—and now they are still refusing to give either side an advantage.

Instead, this month they voted locally on what mattered locally. Paris went left not because the Socialist challenger, Bertrand Delanoë, was a charismatic figure—he is far from it—but because the right was bitterly divided between Jean Tiberi, the incumbent mayor disowned by his own (and Mr Chirac's) Rally for the Republic (RPR), and the Gaullist RPRclosesinglequoteS official candidate. And because of Mr Delanoë's obvious commitment to Paris and his promise of a clean break with the corrupt past. So 12 of the 20 voting districts went his way.

In Lyons, the Socialists' Gérard Collomb and his team won a majority of the districts (though there too a minority of the popular vote) because voters did not trust the uneasy, second-round alliance between two conservatives, one of whom only three years ago was in bed with the far-right National Front.

In contrast, several ministers eager to add local office (or at least victory) to their laurels were humiliated. The Green environment minister, Dominique Voynet, and the Communist transport minister, Jean-Claude Gayssot, never even got to the second round in their cities. The employment minister, Elisabeth Guigou, just did so in Avignon, but was then trounced. So was the European-affairs minister, Pierre Moscovici, in Montbéliard. If only by 37 votes, Jack Lang, the education minister, lost Blois, which he had controlled since 1989. "I've realised you can't be at the oven and the mill at the same time," he admitted ruefully.

But the post-mortem Mr Jospin has arranged for the end of this month will have to involve more than a simple affirmation of his long-standing reluctance to let ministers hold local office too; those who did win have been told to choose one job or the other. He will have to revive morale. Did a government that has produced a shorter working week, cut unemployment and produced livelier economic growth than Germany's simply become too complacent?

Second, Mr Jospin will have to keep his coalition partners happy. The Communists, with their ageing

candidates, did poorly in the voting; so they will demand worker-friendly measures, which could undermine the government's financial rigour. The Greens did fairly well: only with their aid did Mr Delanoë win Paris. But they will now want more than Mr Jospin's usual lip-service to their environmental concerns.

And on the right? In Paris Mr Tiberi is spitting Corsican fury at the RPR's folly in excommunicating him, while his rival, Philippe Séguin, ripostes that the voters had simply had enough of its scandals (by implication, not just under Mr Tiberi but also under his predecessor from 1977 to 1995, one Jacques Chirac). The president may well argue that "Paris is not France", but his prospects must have been hurt by the loss of what was always his power base. Not hurt enough, though, to help his rivals on the right, François Bayrou, of the Union of French Democracy (UDF), and Alain Madelin, of the newer Liberal Democracy party. As one analyst puts it: "Every time the television announced a right-wing gain, you could see Alain Madelin grit his teeth."

The real need on the right is to find what Mr Chirac has called a "renewal" of the nation's politics. What this might mean for policy is anyone's guess, but at least the right has found fresh blood, especially in the UDF. In Strasbourg, a former Jospin minister was ousted from her power base by 41-year-old Fabienne Keller. Blois fell to a 34-year-old, Nicolas Perruchot; and in Drancy, Jean-Christophe Lagarde, the 33-year-old leader of the UDF's youth wing, ended 66 years of Communist control in the first round.

Arguably, Mr Chirac, at 68, is a bit old to play the reformer convincingly. A better tactic might be to persuade the UDF to co-operate with the RPR to block Mr Jospin's plan to reverse next year's electoral calendar. As things stand, the parliamentary election will come a couple of months before the presidential one; an anomaly, in Mr Jospin's view, that should be changed. Not in Mr Chirac's. After all, if the parliamentary election goes as poorly for the left as this month's local ones, then its chances in the presidential one would surely be hit.

In a country where voters have three times forced their leaders to cohabit, that calculation is not necessarily right. As François Hollande, the Socialists' secretary-general, puts it: "Everything is open for 2002. It'll be a year of intensive government." It will certainly be one of scheming and nastiness.

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Germany

New mammoth

Mar 22nd 2001 | BERLIN
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AFTER three years of negotiations, five German service-industry unions merged this week to form the biggest trade union in the free world. But that does not mean that the new union of 3m members will also be one of the world's most powerful. For ver.di, as the new union is to be known after its German name *Vereinte Dienstleistungsgewerkschaft* (United Service Industries), but with a lower-case "v" and the dot popped in to signal entry into the Internet age, was born only reluctantly—and out of weakness rather than strength.

AP

Bsirske conducts ver.di

Representing more than 1,000 different trades and professions, ranging from dustmen, nurses and musicians to web-designers, bankers and stock-exchange operators, it will find it hard to forge a new identity or to satisfy its members' often very different, sometimes even conflicting, interests.

Like most of Germany's other trade unions, the five that have come together to form the core of ver.di, including the big public-sector union ÖTV, have been suffering from sharply dwindling funds and membership: nearly 500,000 have dropped out in the past four years. Of the rest, only 5% are under the age of 28.

So the five unions realised that they would have to brighten their dreary image, offer fancy new services to members and put aside damaging inter-union rivalries, especially to entice young people from new dotcom companies where only 5% of workers at present belong to a union. Yet the mammoth new outfit now embraces nearly 40% of all Germany's trade-union members.

Frank Bsirske, ver.di's dapper and dynamic new boss, made quite a splash at the giant's founding congress in Berlin this week. Germany's president, Johannes Rau, and its chancellor, Gerhard Schröder, both gave speeches. "We can't be ignored!" proclaimed a triumphant Mr Bsirske, a former personnel officer who supports the Greens.

Is he right? Many of ver.di's older people, unable to find a home in the brash new super-union, could soon opt out. By agreeing to keep all 5,000 employees of its five constituent unions on until 2007, twice the number who work for the only slightly smaller metal-workers' union, IG Metall, ver.di has taken on a huge financial burden. And union rules that ban people in one of ver.di's many branches from coming out in support of striking workers in another will lessen the monster union's ability to twist the arms of either employers or government. Still, with that sort of manpower behind it, ver.di will count for something. Mr Schröder will certainly think it best to be polite to Mr Bsirske.

Our Berlin correspondent, Diana Geddes, has been awarded the Anglo-German Foundation's annual prize for coverage of Germany

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Proud German?

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From The Economist print edition

COULD anyone imagine a French president or a British prime minister or indeed just about any other world leader refusing to say he was proud of his nationality? Yet that is precisely what Germany's president, Johannes Rau, a Social Democrat, has refused to do. But it is a sign of the times that a rumpus, unusually, has ensued.

For decades after the second world war, any national symbol or expression was taboo. As Gustav Heinemann, another German president, declared in 1969: "I don't love my fatherland; I love my wife." As late as the 1980s, Joschka Fischer, then a Green deputy and now foreign minister, raged in parliament against "nationalist filth". Today, despite a growing sense of nationhood since unification, nationalism is still a dirty word for most Germans.

The recent row actually started last week, after Laurenz Meyer, general secretary of the opposition Christian Democrats, bluntly declared: "I am proud to be German." He knew he would create a stir, for that simple phrase has long been a rallying cry of Germany's neo-Nazis. But in the approach to two state elections on March 25th, in Baden-Württemberg and Rhineland-Palatinate, Mr Meyer was out for the hard-right "patriotic" vote. Jürgen Trittin, the left-wing Green who holds the environment portfolio, then accused the balding Mr Meyer of having "not just the appearance of a skinhead but the mentality of one too".

As the nation's moral arbiter, President Rau sought to sidestep the pitfall by declaring that one could be "glad" or "grateful" for being German, but not, ahem, proud. One could be proud only of something one had personally achieved. But these cautious comments merely fanned the flames. "One must ask if a president who lacks this pride can represent a country of 80m citizens," fumed Thomas Goppel of the Christian Social Union, the Christian Democrats' beefy Bavarian sister party.

With his eye on the forthcoming state elections, a worried Chancellor Gerhard Schröder, a Social Democrat, felt obliged to enter the fray. "I am proud of what people have achieved and of our democratic culture," he said. "In that sense, I am a German patriot who is proud of his country." Not quite proud to be German, then, but getting daringly closer to it than any previous post-war leader.

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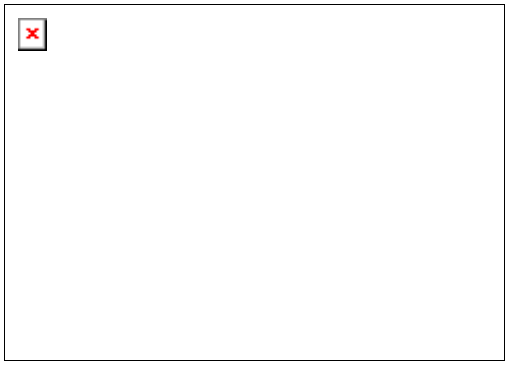
Russia

Good works

Mar 22nd 2001 | MOSCOW
From The Economist print edition

Official ignorance and suspicion towards Russia's charities are giving way to interest—and the danger of a stifling embrace

BIGGER, more numerous, better run and with increasing clout, Russia's charities are beginning to fill the hole left by 70 years of bogus state-monopoly altruism. Though there are few exact statistics, the number of active do-gooding outfits now tops 100,000. Especially in local government, there are the beginnings of a real partnership between the state and private do-gooders. Of Russia's 89 regions, the number that have formal co-operation arrangements with, for example, groups working with orphans and the disabled, has risen from 12 in 1998 to 40 now.



That marks a big change. Russian officials used to see charities either as meddlesome critics or competitors for jealously guarded power and influence. There is even a bit more interest from federal government. Last week the Kremlin held a conference organised by the United Nations' children's agency, Unicef. Around 1,000 delegates from children's charities attended. The social-affairs minister, Valentina Matvienko, gave an approving speech. That would have been unheard of a few years ago.

But the progress is still slow. Russia's tax code, and the bureaucrats who enforce it, stops charities doing sensible things like running shops to raise money: that would be "commercial activity". This week George Soros, an American philanthropist, announced a temporary halt in his $1.5m programme of individual grants, because the authorities are trying to levy a 35.9% tax on them, arguing that they are "wages".

The government says it is willing to negotiate. But other difficulties have more sinister causes. Registration is tough, especially for charities dealing with such subjects as legal reform, the environment, or civil liberties. A few years ago President Vladimir Putin himself said that environmental groups were fronts for spies.

Campaigning charities now say that receiving foreign grants, or employing foreigners, is increasingly risky. Russia's ultra-twitchy spy-catchers easily jump to the wrong conclusion. That can be very unpleasant. Despite a postponement this week, Grigory Pasko, a journalist accused of treason for leaking details of the navy's dumping of nuclear waste, is due for trial in Vladivostock in June. He had been acquitted in an earlier trial, but the authorities have simply restarted the case from scratch.

Some do-gooders worry that officials' new-found enthusiasm for charity may end up compromising their independence. The most immediate danger is at a local level, where there are few checks on top officials' whims. But last year people close to the Kremlin floated the idea of combining all Russian welfare charities into one big one—to be headed by none other than Mrs Putin. That has gone no further, for now.

Official help or hindrance aside, the picture is still patchy. Training for charity workers and administrators is now widely available. "We simply don't need foreign trainers any more," says Elena Topoleva, of the Social Information Agency. Charities are also much better at using the legal system on behalf of those abused by employers or bureaucrats. Charities bring tens of thousands of such court cases a year—though having judgments implemented is still difficult.

Fund-raising (*fantreising* in Russian) is still a novel concept. Many charities are better at getting grants from western donors than at tapping rich Russians. This is mainly a legacy of Soviet mistrust, coupled with the very bad reputation that charities connected to military ex-servicemen, the Russian Orthodox

church and sport gained in the immediate post-Soviet period. Many were purely commercial outfits seeking to benefit from privileged tax and customs status, and were often run by organised-crime groups. Most have now shut down.

However, some of Russia's best-known tycoons have started giving money. Vladimir Potanin, for example, who grabbed the country's nickel industry at a knock-down price in the mid-1990s, now gives $1m a year to pay stipends $40 a month to students. Boris Berezovsky, another magnate currently living abroad for fear of arrest at home, has donated generously to the Sakharov House in Moscow, one of the few groups trying to help Russia come to terms with its totalitarian past. Vladimir Gusinsky, a media tycoon on bail in Spain and under heavy fire from the Kremlin, has given money to improve conditions at one of Moscow's worst prisons, where he spent a few uncomfortable nights last summer.

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A monarch for the Serbs?

Mar 22nd 2001 | CACAK
From The Economist print edition

EPA

The late King Peter backs his boy

"A MODERN monarchy for a modern Serbia." It is in those rather paradoxical terms that Velimir Ilic, the burly provincial mayor who masterminded last year's uprising against Slobodan Milosevic, imagines the future of his country.

For the majority of Serbs struggling to scrape a living and fretting about the violence on their country's southern fringe, the restoration of the Karadjordjevic dynasty, deposed after the second world war, is not the most urgent priority. But in the town of Cacak, whose mayor and citizens spearheaded the storming of the Belgrade parliament last October, the head of the Karadjordjevic family, 55-year-old Crown Prince Alexander, can always be sure of a welcome. He was feted there when he popped in after Mr Milosevic's fall.

Royal visits to Cacak, moreover, will soon grow more frequent after the emotional ceremony in London on March 12th, when Zoran Zivkovic, the Yugoslav interior minister, gave the prince a certificate of citizenship and the right to reclaim family properties. The proceedings took place in the hotel suite—declared by Churchill to be Yugoslav soil—where the heir was born.

After a lifetime of exile, including spells as a British army officer and banker, the prince hopes to move back to Serbia soon, though he has made it plain that he will not reclaim the throne or challenge Yugoslavia's republican constitution unless the royalist sentiment that already abounds in Cacak becomes more widespread.

As one of the few places in Serbia which Marshal Tito's regime never quite subdued (psychologically, at least), Cacak has always been a bastion of everything the communists were against, from monarchism to free enterprise. That helps to explain why Mr Ilic, an earthy pragmatist whose talk is all about hard work, common sense and the rolling up of sleeves, is an enthusiast for the sentimental-sounding cause of monarchism.

Although they stood shoulder to shoulder in the October uprising, and Mr Ilic's small New Serbia party is a reluctant member of Belgrade's ruling coalition, the mayor is also an increasingly strident critic of the "indecision" and "foot-dragging" of Yugoslavia's president, Vojislav Kostunica. Yet one of the few things that unite mayor and president (and, at least for now, divides them both from most other Serbs) is a soft spot for the prospect of a constitutional monarchy.

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War in the Balkans, again?

Mar 22nd 2001 | TETOVO
From The Economist print edition

EPA/AP

The fighting in Macedonia between ethnic-Albanians and Slavs could lead to another Balkan war

Get article background

TO ANYONE who has watched south-eastern Europe's miseries over the past decade, the scene in the hitherto agreeable Macedonian town of Tetovo, noted for its pretty textiles, pleasant cafés and access to the ski slopes, looks dreadfully familiar. The ramshackle forces of a ramshackle government have been blasting away—however ineffectively—at a mountain range where guerrillas are darting about with fair impunity, confident that they have seized the initiative. In this case, the highland fastness being peppered with pointless tank-fire is Mount Baltepe, where ethnic-Albanian rebels have been sitting more or less comfortably in a ruined Ottoman fortress and control half a dozen villages.

The fortress guards the way into the Sar mountains that overlook northern Macedonia and southern Kosovo—snowy, forested terrain where guerrillas and their mules have an easier time of it than the regular soldiers trying to stop them. Despite the increasing efforts of NATO soldiers to rein them in, it is quite easy for resourceful rebels to slip past them. Even NATO's cleverest drones have trouble with thick clouds. In recent days, the alliance has assigned more troops to border patrol, and they have claimed a few successes—but it may be too late.

In another all-too-familiar scene, civilians—albeit only 8,000 of them, a handful by recent tragic standards—have fled their homes. And co-existence between two rival ethnic groups (in Macedonia, the Slav majority and an ethnic-Albanian minority that accounts for about a third of the population) is in real danger of collapsing horribly, both in the corridors of political power and in countless streets and villages. Carl Bildt, the Swede who is the UN's envoy to the Balkans, describes the news of the standoff in Macedonia as the region's worst in many years.

The atmosphere in the mainly ethnic-Albanian town of Tetovo, which changes subtly by the hour, gives some indication of how close Macedonia—and possibly also the surrounding region—is to an unstoppable meltdown. Young Albanians openly support the guerrillas; their community has waited too long, they say, to assert its rights. That, at a minimum, would mean turning Macedonia into a binational, bilingual state rather like Belgium.

Slav Macedonians living in and around the town are seething with bitterness and encouraging their government to crack down hard. Feelings are especially strong among poorer Slavs who, in

a refrain well-known from other communal conflicts, say their Albanian neighbours already have things too good by half, with their flourishing black economy and an Albanian-language university due to open later this year. Besides, an Albanian party is in the government coalition, and has, among other posts, the justice ministry. What more, the complaint goes, do the ethnic Albanians want? How can they be so ungrateful, it is added, when Macedonia (a bit grudgingly) opened its borders to hundreds of thousands of refugees from Kosovo during the 1999 war?

As inter-communal relations come under strain—without yet reaching breaking-point—in the streets of Tetovo, a similar drama is unfolding in Skopje, the Macedonian capital 40km (25 miles) to the east, where two policemen were shot, one fatally, on March 21st. His fellow Slavs are urging President Boris Trajkovski to smash the rebellion, while his ethnic-Albanian coalition partners—and western governments—warn him that precipitate action would plunge the country into civil war. America and Britain are offering military advice, plus tips onhow to be restrained—with mixed results.

On March 20th, Macedonian tanks in Tetovo began firing at rebel positions. But pressure from various quarters, including Javier Solana, the European Union's foreign-policy spokesman, persuaded the government to declare a 24-hour truce. Mr Solana also helped persuade two moderate ethnic-Albanian parties to call on the guerrillas to lay down their arms. Late on March 21st, the guerrillas declared a ceasefire; but next day Macedonian forces resumed their bombardment of the hills above Tetovo.

For all its familiar features, some things about this incipient war have surprised the most seasoned observers of the Balkans. Most striking is the speed with which the National Liberation Army (NLA) has emerged as self-appointed protector of Macedonia's minority, already speaking with a tough and sophisticated political voice. Though many, perhaps most, of the fighters in the new force are from Macedonia, their commanders include some of the hardiest veterans of the Kosovo Liberation Army and its war against the Serbs. Several senior lieutenants of Ramush Haradinaj, a warrior-turned-politician who rules the roost in western Kosovo, have turned up in the NLA.

Whether or not the western protectors of the southern Balkans have drawn any lessons from the past decade, militant ethnic Albanians certainly have. They have learned how to conduct a skilful war of nerves with NATO and its 44,000-strong peacekeeping force: being careful not to alienate the western armies (and especially the Americans who guard south-eastern Kosovo) wherever that can be avoided, while subtly warning the westerners not to rock the boat. But, like many a guerrilla army, the NLA knows that any overreaction by its adversaries—a really ferocious attack on an ethnic-Albanian village, for example—will work to their advantage by radicalising their community.

Many pundits see a direct link between the violence now brewing in Macedonia and the frustration of the harder-line Albanian nationalists in Kosovo over political developments in that province. These factions are still smarting from their humiliation during last October's local elections in Kosovo, when moderates led by Ibrahim Rugova did best. Since then, the Kosovo Albanians as a whole have been alarmed by the western world's improving relations with the new Yugoslav government, led by Vojislav Kostunica, and its loss of enthusiasm for the idea of eventual independence for Kosovo—which is notionally part of Yugoslavia, though in practice a protectorate of the UN and NATO. The more-or-less amicable way in which NATO and the new government in Belgrade have co-operated in dealing with ethnic-Albanian guerrillas in southern Serbia is, from the Kosovars' viewpoint, depressing news.

Until recently at least, impatient ethnic-Albanians were counting on early Kosovo-wide elections as a first step towards self-determination. But Hans Haekkerup, the Dane who runs the province for the UN, has dashed those hopes, ruling out a ballot until next year at the earliest. This may have played into the hands of extremist Kosovars, who say only force will achieve results.

Indeed, influential Kosovars have been warning their western friends in recent weeks that they are ready to "go back to war" if their community sees no prospect of self-determination (in other words, full independence) through peaceful means. If that warning is understood as a threat to attack western troops in Kosovo itself, it sounds very much like bluff. After all, if NATO were forced to quit the province, that could simply give the Yugoslav army free rein to re-enter and settle old scores. But if the warning of

a “return to war” is understood as a threat to ruin Macedonia’s fragile equilibrium, then it sounds all too plausible—and it looks very much as if the threat is being carried out.

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The spleen of Europe

Mar 22nd 2001 | BRUSSELS
From The Economist print edition

Tony Blair says that his policies have put Britain back "at the heart of Europe". That is not how it looks in Brussels

WHATEVER happens at this weekend's Stockholm summit of the European Union, you can expect Tony Blair to proclaim that Britain's agenda of "economic reform" has advanced, and that this shows the benefits of a pro-European policy which puts the United Kingdom at the "heart of Europe". Such proclamations may go down well at home. But they are likely to be greeted with scepticism in the European Commission, the policymaking centre of the EU.

Prodi the federalist and Blair the refusenik

The current attitude of the leadership of the commission to Mr Blair is one of cold fury. One very senior official says of the British prime minister: "All he says is 'No, no, no, no'. You say good morning to him, and he says 'No'." Britain is felt to be obstructing commission plans in a number of areas from tax co-ordination through social policy to the development of a European satellite system. The British argue that they have been playing a positive role over the development of defence policy and over economic reform. But they do not get much credit for this at the commission.

Both before and after last December's Nice summit, Romano Prodi, the head of the commission, made it clear that he was deeply irritated by Britain's refusal to contemplate a move to majority-voting on tax issues. Mr Prodi has argued that the changes he wants do not remotely threaten Britain's right to set its own taxes. They are, he says, to do with precisely-defined issues such as fighting fraud and avoiding double taxation. But the British are suspicious, fearing that a phrase like "fighting fraud" might prove infinitely elastic, once the nimble minds at the commission got to work on it.

Back in 1999, when Mr Prodi was first appointed, he was seen as almost a protégé of Mr Blair's. An Anglophile and an economic reformer he was, as the phrase goes, somebody Mr Blair felt he could do business with. But the two men have discovered that they have very different views on the need and scope for further European integration. "What Blair missed," says a high-ranking Briton at the commission, "is that Prodi is basically a classic Italian federalist."

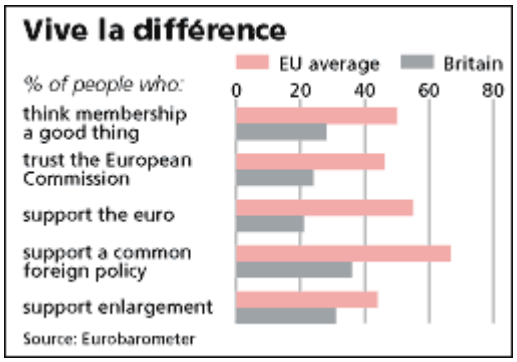
Mr Blair's unpopularity with the European Commission casts doubt on Mr Blair's claims to have put Britain "at the heart of Europe". But it does not completely undermine them. For much of Mr Blair's European policy has concentrated on trying to bypass the commission, and instead to develop stronger inter-governmental ties with other EU countries. Some British officials have taken to calling this policy "the new bilateralism".

The most obvious fruit of this policy was the Anglo-French initiative to develop an EU defence arm, which was subsequently taken up by other EU countries. In recent months there have been other modest examples of such bilateralism; an Anglo-Italian initiative on beefing up border controls in the Balkans, and an Anglo-Dutch joint paper on biotechnology.

But these bilateral initiatives are unlikely to be enough to paper over big differences between Britain and the key players within the 15-member EU. These divergences are likely to become increasingly uncomfortable for Britain in the second half of the year, when Belgium takes over the agenda-setting presidency of the EU. Under the Belgian presidency, the British may well find themselves fighting a losing battle against closer economic co-operation between the 12 EU members who have adopted the euro. Despite not joining the single currency, the British are trying to prevent the "euro group" from developing their own policymaking capacity—a position that is likely to prove increasingly untenable. The British may also find themselves outvoted when they try to block the EU adopting new measures under the "social chapter", which will effectively makes works councils mandatory at all medium-sized companies in the

EU.

The discussion that should most worry Mr Blair, however, is the one on the political future of Europe. A declaration on this subject will be adopted at the EU's summit in Belgium in December. The whole discussion will highlight the extent to which Britain—even under Mr Blair—is much less keen on further European integration than Germany, Italy, the Benelux countries and even France. This is no accident. It is an accurate reflection of the divergence between British public opinion, and opinion in the rest of Europe. This goes well beyond British reluctance to join the euro. According to the latest Eurobarometer opinion poll, 65% of EU citizens support the idea of a common European foreign policy (see chart), but only 36% of Britons do.



Britain's innate euroscepticism is likely to undermine Mr Blair's attempts to put Britain at "the heart of Europe", even if he does win a second term. Senior people at the commission are already speculating about the prospect of another crisis in British relations with the EU. Mr Blair might reflect that both his predecessors as prime minister, Margaret Thatcher and John Major, won re-election only to be ultimately destroyed by the European issue.

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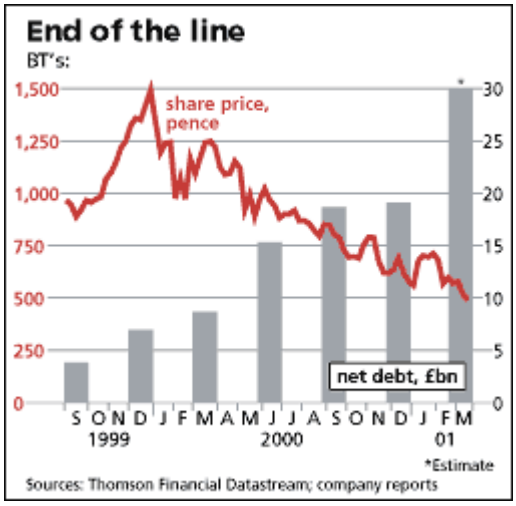
BT

Time to split

Mar 22nd 2001
From The Economist print edition

Behind BT's failure to deal with its debt problems lies its inability to shake off the mentality of a national monopoly

WHO would have thought that the cancellation of a dinner would cause such a fuss? Planned for March 20th, the meal was apparently intended to allow BT's executives and large shareholders to discuss the growing problem of its debt, which currently stands at £30 billion ($43 billion). But the dinner was called off at the last minute. BT would not say why, but the general assumption is that BT's bosses feared that if they went ahead with the dinner, they would find themselves on the menu.



BT, Britain's formerly state-owned former telecoms monopoly, has dug itself into a hole by buying stakes in overseas telecoms firms and paying billions of pounds for licences to operate "third generation" mobile phone networks. In doing so, it has followed the industry wisdom that telecoms firms need to become global and be ready to exploit the anticipated (until recently, at least) boom in Internet-capable mobile phones.

But this strategy has not worked well for BT, for two reasons. First, the company is essentially a conglomerate, with different divisions offering fixed-line, mobile and data services to businesses and consumers. As a result, BT's shares are unattractive compared to those of a more focused, wireless-only firm such as Vodafone. So while Vodafone can pay for acquisitions with its own shares, BT must pay cash, which it has to borrow.

Second, even though it has bought minority stakes in overseas operators, BT has repeatedly failed to turn those minority stakes into controlling interests. True, BT now controls mobile operators in Germany, Ireland and the Netherlands, in addition to its British operator, Cellnet. But with smaller stakes in operators in Japan, India, Malaysia and eight other countries, it is hard to avoid the conclusion that BT spread itself too thin.

Hence the restructuring plan, unveiled last November by BT's chief executive, Sir Peter Bonfield, who proposed splitting BT up into eight divisions and floating off minority shares in some of the sexier bits. In particular, the plan called for 25% of BT's wireless division, BT Wireless, to be sold off in a share offering which was expected to raise £10 billion to go towards the debt. Selling off selected minority holdings in overseas firms was expected to raise another £5 billion or so.

But the slide in telecoms shares has now scuppered this plan. Last month's share offering by Orange, which is owned by France Telecom, raised less than half as much as expected, and the markets' subsequent further decline means that floating off a chunk of BT Wireless is out of the question for the time being. And falling share prices make this a terrible time to sell unwanted foreign assets.

Another option would be a rights issue, in which existing shareholders would be offered new shares at a discount. Rumour has it that Sir Peter and BT's chairman, Sir Iain Vallance, were going to propose just such a rights issue, to raise £5 billion, at Tuesday's non-dinner—but pulled out for fear that, in return, the shareholders would ask one or both of them to resign. Instead, the firm is now expected to pursue more low-key meetings with individual investors to get them to agree to the plan. But while a rights issue would reduce the debt slightly, it would not be enough to prevent BT's credit rating from slipping. And that in turn would increase BT's annual interest payments by as much as £200m.

So what can BT do? One possible approach was outlined in a recent research report by Mike Williams, a

telecoms analyst at Deutsche Bank. It calls for a £5 billion rights issue to stem the bleeding, plus the sale of selected overseas assets, including BT's stake in Japan Telecom (which the firm recently insisted it had no intention of selling) to raise another £5 billion. But the key to the plan is that BT's wireless and directory divisions should be fully demerged, rather than partially sold off, and that they should have some of BT's debt transferred to them. (The wireless division, for example, would take on £3 billion of debt.) BT would then end up with a debt of £15 billion.

That would be a difficult decision to take. BT, born in 1870 as Britain's telegraph operator, still has the heart of a national monopolist. By spinning off its wireless division, which is where the excitement is and the growth is expected, it would condemn itself to the margins of the business. But that may be one of its few remaining options.

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Tony and the absolute

Mar 22nd 2001
From The Economist print edition

THE words “natural law” are not often heard in political discourse these days—unless you are the pope, and are talking about contraception. Tony Blair is not yet the first and has not yet put out policy guidelines on the second; but in an interview in the *Sunday Telegraph* he confessed that he now has quite a liking for natural law. With some excitement, he told his interviewer he was “far more of a believer in...in...the power and the necessity to make judgments about the human condition, as opposed to simply saying, well look, what’s good for the greatest number is fine.”

Whoa there. Even leaving aside the Hegelian ring of “power” and “necessity”, this is frightening stuff from the man who invented New Labour. Natural law has absolutes behind it. Those who subscribe to it hold that there are definite values, and only one right way of thinking and acting, according to immutable laws of “right reason” programmed into the human mind. There is no splitting the difference in natural law, no Third Way: there is only, as that old Tory Thomas Aquinas wrote, *sic et non*, yes and no.

Does he believe it? Hard to say. It would be a bold prime minister who went against Jeremy Bentham’s rule that the best governing policy is to do what makes most people happy. Gordon Brown’s last budget was blatantly Utilitarian, seeking the greatest good of the greatest number of likely Labour voters. Mr Blair’s most discernible nod to natural law has come over fox-hunting: there is a right way to behave (peaceably walking your hound in Islington), and a wrong (setting it on a fox in Rutland).

But there is a difficulty. If natural law resides in an absolute, what is that absolute? Aquinas thought it was God’s reason. Hobbes and Rousseau thought it was the original state of Nature, before civilisation made it too complicated. The first suggests a monkish chap, with ecstatic gaze, seeking to conform his actions to the mind of God. The second suggests a naked savage bent on self-preservation. Neither image offers much reassurance to voters. Perhaps the wise politician indulges his absolutist tendencies only in private.

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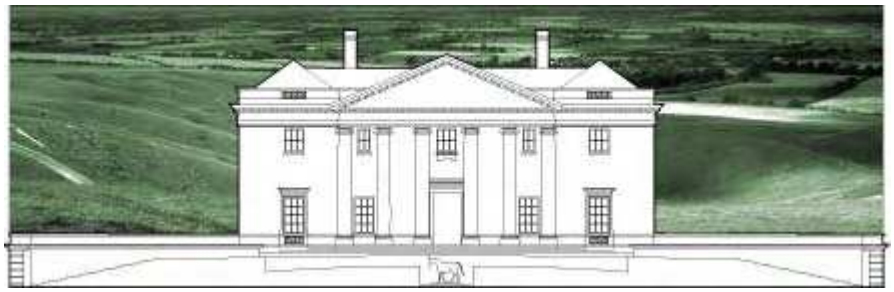
Housing the rich

The Palladian splendour of PPG7

Mar 22nd 2001
From The Economist print edition



There is a boom in grand country-house building, and a dreary uniformity of style in the mansions it has produced

IF THERE really is a crisis in Britain's countryside, as many people claim, someone seems to have forgotten to tell the country's latest generation of millionaires. While farmers and small businesses are lobbying government to save them from everything from rural post-office closures to foot-and-mouth disease, Britain's rich have been quietly pouring millions into the rural economy in the shape of country houses. Not since the late 19th century has there been such a rush to build new stately homes. At the moment, one official body responsible for vetting these new buildings is receiving two or three applications every month.

Many Britons, and even more foreigners who do business in Britain, made a great deal of money in the 1990s. And like generations before them, they have been drawn to the quintessential English means of showing off one's wealth; buying up a landed estate and then building a country house on it. Amongst the foreign-born businessmen currently building their pleasure palaces are a Syrian-born billionaire, Wafic Said, at Tusmore House, near Banbury in Oxfordshire, and Dev Dadral, an Asian entrepreneur building a new mansion at Delaford Park in Buckinghamshire. Tusmore House is expected to cost £10m.

Also among the new breed of aspiring home-grown builders are Peter Fowler, a Scottish media tycoon, and Viscount Rothermere, chairman of Associated Newspapers. Mr Fowler has just had his application to build an eight-bedroom country house at Bedlam Green Hall near Wincanton in Somerset turned down by the local district council. He will now appeal. The young Viscount Rothermere has got the go-ahead to build Ferne House, near Berwick St John in Wiltshire. One of the most controversial schemes involves a property developer, Nicholas Van Hoogstraten, who is building Hamilton Palace near Lewes, in East Sussex, which is expected to cost £30m and includes its own mausoleum.

But in densely populated Britain, money is nothing without planning permission, and the principal reason for this sudden spate of country pile driving is a subtle but important change to the planning regulations. Country-house building was last in vogue just before the first world war. In egalitarian post-war Britain local councils and planners frowned upon this privileged type of land use.

That all changed in 1997, when John Gummer, a Tory environment minister, amended the planning regulations to include a new clause, the snappily-titled "PPG7". The new rule allowed country houses to be built if they were of "truly outstanding design", if they enhanced their surroundings and if they also took account of "regional building traditions".

PPG7 was introduced as part of a conscious attempt to raise the standard of architectural practice in Britain. To this end, most new country-house designs are submitted for approval to a government quango called the Commission for Architecture and the Built Environment (CABE).

Palladian is the preferred architectural style for the new country house. Guests arriving at Mr Said's Tusmore House, for instance, will be met by a severely classical, giant Ionic portico, from which they will enter a central hall ringed by columns, topped by a glass cupola. No expense has been spared on the retro-landscaping, with an equestrian statue, plenty of topiary and an orchid-house all included in the plans. The single crane that now dominates the building-site is so tall that the engineers had to check that it would not interfere with low-flying aircraft.

The deep conservatism of the designs has begun to exasperate CABE. It points out that there is nothing in PPG7 which insists on a classical style. And yet either because of the natural conservatism of the rich, or because of their fear of the planning authorities, most prospective country-house builders have erred on the side of caution and opted for neoclassical designs. The design-review committee of CABE has seen only one non-classical country-house design, for Swinhay House, near Stroud, Gloucestershire, complete with the latest in energy-conservation technology and all manner of environmentally sound features. The committee endorsed it enthusiastically.

Proponents of the country house argue that these new buildings will help to restore some of the historic balance in the countryside that was lost as the old houses were sold off or demolished during the last century. The best-kept areas of lowland England were usually those parts of country estates that had a country house at their core. The new houses may fail to excite the architectural intelligentsia, but they may help to stabilise parts of rural England as farming lurches further into crisis.

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Bagehot

Pre-election fever

Mar 22nd 2001
From The Economist print edition

SO FIRM does the date appear that you might think Tony Blair had sent out battalions of town criers to proclaim a general election on May 3rd. In fact, no date has been formally announced: the government has merely inserted May 3rd into the national consciousness by its usual process of media osmosis. Indeed, Mr Blair has 13 months still to play with before an election falls due. With a majority of 179, you would think he could limp along a while longer. And yet his government has spent much of this week arguing against the "postponement" of an election which it has not yet called, and which it has no need to call. In a truly novel argument for May, the prime minister gave warning that not going ahead with the local elections that are (really) due then would scare off foreign tourists.

William Hague is meanwhile struggling, with an equal lack of subtlety, to excise May 3rd from the political calendar. He has a powerful incentive. On present polls, the Tories are at about 30% and Labour at about 50%. Though this would not produce another mass cull of Tory MPs, it would produce another big defeat, and another big defeat could well tempt those Tories who survived it to propose the humane slaughter of their present leader. The awkwardness for Mr Hague is that no opposition leader can be seen to duck a fight. The official line on Planet Tory, you may remember, is that party and people alike are straining like greyhounds in the slips for their earliest possible opportunity to evict Labour from office and rescue Britain from a vile fate as Mr Blair's "foreign land".

From that perspective, the plague of foot-and-mouth disease that has descended on Britain's farms descended on Conservative Central Office like manna from heaven. Even before the outbreak, the Tories had invested a good deal of political capital in the claim that whereas they instinctively understand rural life, Labour is wilfully ignorant of it. Even in the calamitous 1997 election, the Tories won 37% of the vote, against Labour's 29%, in the 150 constituencies with the highest proportion of jobs in agriculture. Since then, Mr Blair's plan to ban hunting with dogs has alienated many more rural people. But for the foot-and-mouth outbreak, many tens of thousands of them would have marched on London last Sunday under the predominantly blue banner of the "Countryside Alliance".

Thus far, the Tories' handling of foot-and-mouth has therefore been quite deft. Tim Yeo, the shadow agriculture spokesman, combines a patrician manner with an appropriately ruddy complexion and an impressive grasp of country matters. He pays lip-service to the need for bipartisanship in a national emergency, but portrays Nick Brown, the agriculture secretary, as a well-meaning second-rater without the imagination or sense of urgency the crisis demands. Mr Yeo has bombarded Mr Brown with a barrage of "helpful" suggestions. The Tories say it was they who called first for drafting in the army and final-year student vets; for letting vets slaughter suspect animals without waiting for laboratory tests; and for burying animals immediately on their farms instead of leaving their carcasses to be carted off belatedly by lorry.

Even so, a points victory on foot-and-mouth is hardly likely to save the Tories' electoral bacon in May. What Mr Hague needs is to knock out the very idea of a May poll if, as seems likely, the countryside can still be held to be in a state of crisis then. So although not yet daring to call for the postponement of the election that Mr Blair has not yet announced, on March 20th Mr Hague took a carefully disinfected step in that direction.

It was “undeniable”, he told a press conference, that in at least some counties it would be impossible under present conditions to go ahead with the local elections on May 3rd. In some heavily infected wards in Devon, said Mr Hague, half of the local Conservative candidates are farmers, who would not be able to campaign in the normal way. He called on the government to pass enabling legislation so that it could postpone the elections in such places if matters do not improve by May. By extension, it would be wrong to hold a general election if the “national crisis” was still “out of control”.

Naturally, Mr Blair is far too shrewd to fall into the trap of asking: “What crisis?” With farmers weeping on television, the government has taken care to feel the countryside’s pain. On the very day of Mr Hague’s press conference, Michael Meacher, the environment secretary, unveiled the latest plans to rescue the rural economy. But the epidemic is spreading. Having failed to bring it under swift control, Downing Street now stresses that eradicating it will be a “long haul”, during which normal life, including normal democratic life, can and should continue.

The government is right to say that however wretched foot-and-mouth has made the mood in the countryside, nobody is in serious danger of being disenfranchised by it. The real issue is taste. In the midst of such an affliction, why the distraction of an election? A MORI poll last weekend found 61% of voters against a May election in these circumstances, with 34% saying it should go ahead. An ICM poll reported 52% of voters against, with 40% in favour. But there is little evidence that voters would change the way they cast their votes if the government stuck to its plans. In the prime minister’s mind, the small electoral price he might have to pay must be weighed against the unpredictable perils of “postponement”.

Given this, as the Tories privately acknowledge, the likelihood is that Mr Blair will go ahead. The consolation for the Conservatives is that he will now have to do so in somewhat trickier circumstances than he expected. He will be accused of opportunism. If the epidemic worsens, he may find it hard to keep his usual tight control of the headlines as the campaign unfolds. And he will need to prove that he can manage a national emergency without being distracted by politics. Final victory may be assured, but this is not the start Mr Blair would have wanted.

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My friend Keith

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From The Economist print edition

ROBIN COOK, the foreign secretary, thinks that his embattled colleague, Keith Vaz, possesses “tremendous energy” and has been an “outstanding success” in his job. He is particularly impressed by the dexterity with which Mr Vaz has halved the queues for settlement visas in Islamabad. In short, the foreign secretary is adamant that the minister for Europe “should be allowed to get on with the excellent job he is doing for the people of Britain.”

PA

Vaz, the outstanding success

Mr Cook is of course entitled to defend his colleague. Ominous though such endorsements can sometimes be for their subjects, his expression of faith was no doubt appreciated. But such backslapping is not technically a proper theme for a Foreign and Commonwealth Office (FCO) press release, which is where Mr Cook’s stirring endorsement was made. Official guidance for government press officers states that “information officers or other resources cannot be used for image-making...Ministers must be protected from accusations of using public resources for political purposes.” Political advertisements are supposed to be left to political parties.

Distinguishing between publicity for government policies, and propaganda for the ministers responsible for them, is not always easy. Indeed, the better press officers are at their job of conveying the government’s message, the more they are vulnerable to accusations of bias. But the fact that the line between government and party-political business is difficult to draw is not an argument for ignoring it altogether, as the FCO press release in question appears to do.

This impropriety might be dismissed as the accidental result of Mr Cook’s impetuous rush to defend Mr Vaz. But the indiscretion has precedents: the prime minister’s press secretary, Alastair Campbell, was recently reprimanded by the head of the civil service for improperly associating Conservative economic policy with Mickey Mouse. And critics of the government say that its press offices have been creepingly politicised ever since it was elected in May 1997.

Andy Wood, who was director of information at the Northern Ireland Office for ten years until 1997, says that statements such as Mr Cook’s “should have no place on government press-notice paper.” Almost all of Mr Wood’s counterparts at other departments have been replaced, sometimes acrimoniously, since 1997. Mr Wood says that career press officers are increasingly “cowed” by the proliferating cadre of special advisers that Labour ministers have appointed.

An indelicate attitude to the Whitehall news machine is one of the ways in which, arguably, Labour has in office continued to behave like an opposition. Cynics might say that the neutrality of the civil service is honoured more in the breach than the observance, and is in any case an old-fashioned, impractical requirement, which many other countries do happily without. Certainly, violations of civil-service etiquette are unlikely to excite as much interest as the fecund allegations of sleaze currently swirling around Mr Vaz. Nevertheless, in a quiet, recondite way, the erosion of the civil service’s independent ethos—idealistic though it may be—is a scandal.

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Sleaze

Teflon Tony

Mar 22nd 2001
From The Economist print edition

Accusations of sleaze surrounding the government are multiplying, but the voters don't seem to mind

THERE'S a curious contradiction in the way that Tony Blair has been dealing with allegations of dodgy dealing by his ministers. He forced the resignation of his closest friend in the cabinet, Peter Mandelson, on grounds that Mr Mandelson had been less than candid about his role in helping a wealthy Indian family to secure British citizenship. An official inquiry eventually cleared Mr Mandelson of any wrongdoing in his links with the Hinduja brothers; nevertheless, Mr Blair showed no inclination to bring him back. By contrast, Mr Blair has been defiantly protective of Keith Vaz, the Europe minister, even though the allegations against Mr Vaz, who was also implicated in the Hinduja affair, look more serious.

Mr Vaz has been criticised by the House of Commons standards committee for repeatedly obstructing an inquiry into his conduct in his Leicester constituency. The parliamentary commissioner for standards, Elizabeth Filkin, was unable to proceed with several charges against Mr Vaz because of his failure to co-operate. On one minor charge he was found to have broken parliamentary rules by recommending an honour for a lawyer without disclosing that he had received £500 from him. Mr Vaz now faces yet another inquiry by the parliamentary commissioner, this time into payments made by the Hinduja foundation to a company controlled by his wife.

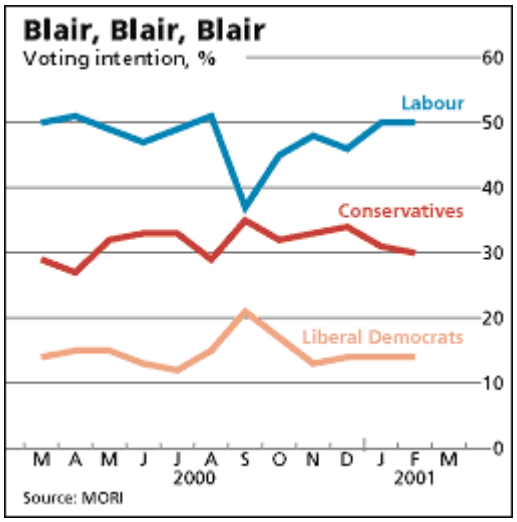
Despite Mr Blair's determination to defend him, Mr Vaz, Britain's only Asian minister, is clearly damaged. He will most probably go after the election, which is expected to be held on May 3rd. The imminence of the election is the likeliest explanation for his temporary survival: Mr Blair may feel that losing two ministers just before a poll looks too much like carelessness.

This week, the government's chief Tory tormentor in the press, the *Daily Mail*, began serialising a book by Tom Bower which accuses the trade secretary, Stephen Byers, of having "deliberately buried" an official investigation into the conduct of the former Paymaster General, Geoffrey Robinson. Mr Robinson has always denied receiving a £200,000 payment from Robert Maxwell, a publishing tycoon whose death exposed financial chicanery in his business. But an invoice for that amount submitted by Robinson, marked "paid", was discovered by a government investigator in 1999. The charge that this disclosure was deliberately suppressed has provoked the threat of a libel writ from Mr Byers.

Juries are unpredictable creatures, but Mr Byers is almost certainly on safe ground because he acted on the advice of civil servants throughout. The inquiry was ordered under Section 447 of the 1985 Companies Act, and those sorts of inquiries are never published. If a charge of suppression is to be made, it should more accurately be levelled at the man who ordered the inquiry to be held in secret, the previous secretary for trade and industry—Peter Mandelson. Mr Mandelson's failure to disclose that he had accepted a £373,000 house loan from Mr Robinson led to his first resignation from the cabinet two years ago.

The latest allegation, that the chancellor, Gordon Brown, improperly pressured his permanent secretary, Sir Terry Burns, to approve a press release which supported the beleaguered Mr Robinson, is embarrassing but hardly new. It is no secret that relations between Sir Terry and the chancellor were tense and that the row over the press release, a version of which appeared in Mr Robinson's own book, did occur. Nor is it any secret that ministers do sometimes put their civil servants in difficult positions (see article). Sir Terry's view of Mr Robinson remains jaundiced but he is understood to feel that the chancellor's role has been exaggerated.

What is perhaps more significant than the actual allegations of sleaze is how rattled ministers are by them. One senior mandarin expressed his astonishment that a government in such a commanding electoral position felt unable to face down its accusers. As far as the public is concerned, two months of gory headlines appear to have had remarkably little effect (see chart). Nothing seems to stick on Mr Blair—yet.



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Farmers

The luckpenny scam

Mar 22nd 2001
From The Economist print edition

Foot-and-mouth disease has drawn attention on some curious practices surrounding the buying and selling of animals

IN NORTHERN IRELAND this week, the mystery of what happened to somewhere between 28 and 60 sheep is front page news. Brid Rodgers, Ulster's farming minister, thinks that they might exist. The people who she thinks owned them are equally adamant they never have existed. Everybody agrees on one thing: if they do exist no-one knows where they are. Normally, nobody would be getting excited about a tiny flock. But because of fears that these sheep might be infected with foot-and-mouth disease (FMD), people are getting very agitated.

These particular sheep were part of a flock of (maybe) 329—the number is disputed—bought at Carlisle in north-west England a month ago. They were supposed to be destined for immediate slaughter in Northern Ireland. But it seems the owner had other ideas; 21 wound up grazing peacefully on a farm in South Armagh and 248 did get slaughtered, but across the border in the Irish Republic. Which leaves up to 60 sheep (possibly) unaccounted for. Since these animals are responsible for the only instances of FMD in Ireland, the frantic search for the missing beasts is understandable. But what this outbreak is also making clear is the extent to which illegality and dodges to beat the taxman pervade livestock farming in the British Isles.

The missing 60 sheep have spotlighted the smuggling of sheep from Ulster into the Republic. Irish farmers pay VAT on sheep; those in Ulster do not. The smugglers turn up at an abattoir, pretend that the sheep are Irish, and qualify for a rebate of VAT which they have not paid in the first place. The scam is estimated to net the smugglers about IR£1m (£800,000) on the 750,000 sheep reckoned to illicitly cross the border each year. Having turned a blind eye to the racket for years, the Irish government has rushed through new laws to stop it.

But stopping some other scams will not be so easy. One of the practices bothering British agriculture ministry officials trying to control FMD is the extent to which sheep are traded privately for cash without any records being kept. There are suspicions that this happened at Longtown market in north-west England, one of the centres of the FMD outbreak.

Malcolm Bendle, the Longtown company secretary, maintains that the market's book-keeping system is so meticulous that private trading is impossible. But one dealer who spoke to *The Economist* estimates that 1% of the sheep going through the market will be sold privately, avoiding the market's 3% commission. As Longtown sells about 15,000 sheep a week on average, that's a lot of sheep. Officials are sufficiently worried to issue public appeals for anyone who bought sheep in this way to contact them.

Another dodge exposed by FMD is that of the "luckpenny". This was originally a jolly country custom which entails the seller of sheep or cattle spitting on a penny, passing it to the buyer who then rubs it on his sleeve, making his new beasts lucky. But these days, the luckpenny (which now runs at 50p for a cheap animal to £5 for an expensive one) is more about tax-avoidance than superstition. It keeps a sizeable amount of cash off the books. Farmers who refuse to stump up may discover that their hitherto healthy flock has suddenly developed defects which render the sale void or that the buyer will ignore their stock at future sales.

The luckpenny certainly has not brought any luck to those who bought animals at Longtown in February. And while the Inland Revenue is being told to be lenient on farmers suffering just now, it may get unluckier yet when normal sales eventually resume and the taxman starts hunting for luckpennies to tax.

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Equity markets

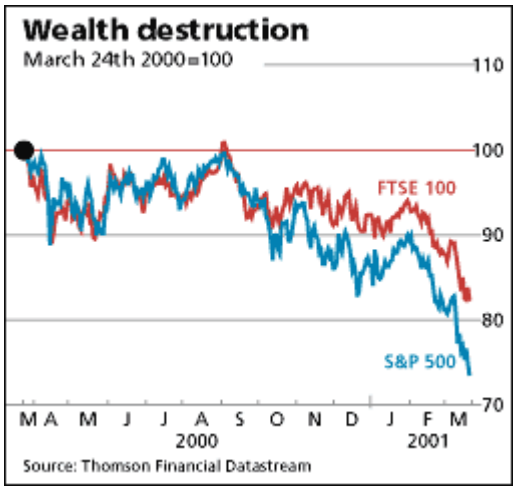
That sinking feeling

Mar 22nd 2001
From The Economist print edition

On March 22nd London's battered stockmarket reeled to its biggest one-day loss since 1987. The real economy will not be immune

AS STOCKMARKETS have tumbled round the world, arousing fears of a global recession, Britain has appeared something of a safe economic haven. For one thing, the decline in share prices has been less dramatic than that in America. For another, British households are generally considered to be more susceptible to the housing market than the stockmarket. But new figures cast doubt on this received wisdom.

British share prices have certainly fallen far less in the past year than the tech-heavy Nasdaq, whose freefall has caused such consternation in America. Over recent months, however, the fall in American high-tech stocks has affected British share prices. The FTSE-100 index of Britain's top hundred companies has fallen virtually in tandem with the index for America's leading 500 companies (see chart). It is down by 15% since the end of January and by more than a fifth since its most recent peak last September. The half-point cut in American interest rates this week brought no relief—rather the opposite. The FTSE-100 fell by 6% over the next two days. It is now at its lowest level for more than two years.

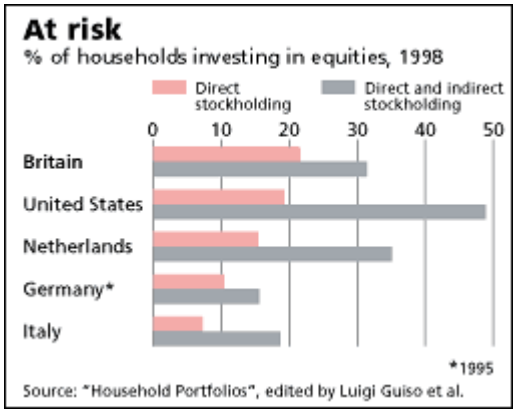


Further declines are likely if hopes of a bounceback in the American economy later this year are dashed. Many of Britain's leading companies earn a lot of money from their operations in America. In addition, they will be affected through slowing demand for exports as the American slowdown affects global trade.

One way that the falling stockmarket will affect the economy is through cutbacks in business investment. New start-up enterprises will be hit particularly hard. They can no longer expect a ready supply of risk finance because their venture capital backers can no longer bank on an exit route through a stockmarket flotation. Established firms are also likely to cut back on their investment programmes because they will be expecting lower growth in earnings. They will also worry more about rising levels of capital gearing—the ratio of debt to the market value of their share capital.

The other main mechanism through which falling equity prices affect the real economy is the wealth effect on consumers. Here, the conventional wisdom is that Britain has less to worry about than America, because personal wealth is concentrated in housing rather than equities. But a new international comparison (see chart) shows that the proportion of households holding equities

directly is higher in Britain than in America. This admittedly reflects the large number of penny-packet holdings of privatisation and demutualisation stocks. But when equities held indirectly—mutual funds and retirement pension accounts (excluding final-salary schemes)—are included, the exposure of British households remains relatively high.



On this broader definition, almost a third of British households hold equities, a much higher share than in Italy or Germany, although lower than in America, where almost half of households hold equities. According to James Banks of the Institute for Fiscal Studies, the value of equities held by a typical British share-owning household is about half the $25,000 held in equities by the typical American share-owning family.

In the past, housing certainly was the main form of household wealth in Britain. From 1985 to 1994, it accounted on average for 56% of the total net wealth of households, far exceeding the 32% share of equities. The wild swings in the housing market in the late 1980s and early 1990s drove the wider economy into boom-and-bust. This explains why the Bank of England worries so much about the housing market.

However, new analysis by the Bank shows that by the late 1990s, equities were level pegging with housing. Each accounted on average for just over two-fifths of households' net wealth between 1995 and 1999. The rising importance of equities in household wealth suggests that the Bank should be increasingly concerned about falling equity prices. According to the OECD, a steep, lasting fall in stockmarkets could inflict a real dent on consumer spending. A 20% fall in the real value of the British stockmarket will, in itself, cut the level of consumer spending by 1% and GDP by 0.4% after two years. If other major stockmarkets around the world also decline by 20%, the effect would be to knock 0.7% off GDP in two years' time.

Such simulations isolate the impact of falling share prices on the British economy. There are many countervailing forces, not least the government's planned fiscal expansion. Minutes released this week show that a majority of members of the Bank of England's interest-rate-setting committee is still fretting about the strength of consumer spending. They know that it will have to grow more slowly if the economy is to absorb the big boost in public expenditure that is on its way without stoking up inflation. The sharp falls in share prices are likely to bring about just such a deceleration in consumer spending. This suggests that any further weakness in the British stockmarket will persuade the Bank to bring down interest rates again before too long.

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Bashar in the steps of his father

Mar 22nd 2001 | DAMASCUS
From The Economist print edition

The early hopes of a more liberal Syrian regime are beginning to dim

THE apartment in a drab Damascus suburb is packed. The crowd, which crams every space right out to the stairwell, has come to play Syria's exciting new game of political shadow-boxing. Reform-minded citizens take to the podium, challenging their government with metaphors, pointed analogies and, sometimes, direct charges of incompetence, corruption or tyranny. The state responds later, through the press it controls, issuing veiled threats to its critics and, occasionally, cryptic answers to some of their milder questions.

Reuters

An olive branch or two on offer

The experience of public debate, even in so elliptical a form, is novel. Before the death of President Hafez Assad last June, Syrians had endured three decades of Stalinesque intolerance. Open dissent was a one-way ticket to exile, jail or worse.

Since the accession of Assad's 35-year-old son, Bashar, things have changed. In his very first speech, he spoke of the need for political and economic reform. Almost overnight, the pictures of his father that plastered almost every wall in the country vanished. Several hundred political prisoners—even the government press described them as such—were released from jail. More reforms followed, including a partial lifting of censorship, the abolition of special security courts, and a slew of laws aimed at prodding Syria's stalled economy into motion.

Businessmen, used to the ruling Baath Party's penchant for spottily applied socialism, dashed with cronyism, welcomed the loosening of the state's clammy grip. Intellectuals felt encouraged to speak out. They did so, in a series of pro-democracy petitions published abroad but widely circulated at home, and in the private forums—the so-called civil-society movement—that have spread to even remote provincial towns. Syrians at large dared hope that their country, which many recognise as a rusting redoubt of single-party rule and command economics, was joining the rest of the world.

Since the start of the year, however, the government has begun to signal stiffer resistance to reform. Some say this is because the old guard, particularly people in the huge security apparatus, who have been creaming off rewards from the system for decades, fear the consequences of change. Others speculate that senior officials simply could not stomach the newly voiced accusations: the charge that Baath Arab nationalism stifles Syria's ethnic diversity, for instance. Still others suggest that the tense regional situation, made tenser by speculation over the policies of Israel's new prime minister toward its neighbours, is making Syria's leaders averse to taking risks at home.

Whatever the cause, there is no doubt that their zeal for political reform has cooled. Talk of allowing new political parties has ceased. Officials now say they will instead revamp the 1.2m-member Baath Party, as well as the three tiny leftist parties that are already legal. Other signals have been more direct. Despite an earlier declaration that the martial law which has been in effect since 1963 is now "frozen", the wife of a prominent businessman is said to have vanished into prison in January after e-mailing an unflattering caricature of the president.

Pressure has mounted against the leaders of the civil-society movement and their private political forums. For months, senior Baathists had muttered about the movement's suspicious foreign links and about the "red lines" that ought to define the permissible range of debate. Mr Assad himself added more oblique warnings in a rare interview published in February, declaring that the forums were not representative of public opinion, that the term civil society was a foreign invention, and that he would never allow the interests of the state to be endangered. Soon afterwards, forum organisers were told they would henceforth need to apply for police permission.

The best known of these organisers is Riad Seif, one of the handful of independent members of Syria's

parliament. He has now been charged with breaching the constitution. His crime, apparently, was to draw up a platform for a new political party that called for a change in the constitution to make it more democratic. Mr Seif is still holding seminars in his home, but attendance has dropped. “I don’t blame anyone who stops supporting me,” he says ruefully. “Given our experience, it’s not wise to be brave.”

Economic reforms, by contrast, are proceeding, though at a pace and style that leave businessmen cautious rather than optimistic. Foreign banks are being allowed to set up shop, but the state institutions that have monopolised banking since 1963 remain so inept that it can take weeks to transfer money between branches. The governor of the central bank enthuses about unifying the exchange rate, but declines to say what the country’s foreign reserves are. Investment guarantees have improved, and convoluted laws regarding property rental are being overhauled. Privatisation of the country’s state industries, which account for 30% of the economy, remains taboo.

Unfortunately, with unemployment pushing 20%, three consecutive years of zero growth and an industrial sector crippled by the legacy of central planning, the changes required are far more drastic than what some describe as “tweaking”. If the government hopes to draw back some of the estimated $50 billion or more that its citizens are believed to hold abroad, or to lure back some of the talented 2m Syrians who work abroad, it will have to opt for real openness.

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Pink hotels on Syria's hills

Mar 22nd 2001 | DAMASCUS
From The Economist print edition

"EVERY time I return from Switzerland, I bring one back," says Ali Laham, proudly pointing to the huge, ornate cow bells on a shelf next to the fondue dishes. Mr Laham, who trained in hotel management in the Alps, owns the Monte Rosa hotel and country club, a large pink tourist complex that has just been built on the foothills of the mountains west of Damascus. The rich families who have snapped up the chalet-style homes built around the hotel can enjoy the club's landscaped gardens and sports facilities, including Syria's first public indoor swimming pool. Next winter, they will be able to glide down the slopes of Syria's first ski centre.

All this is blazing a trail that others are following fast. An Anglo-Syrian group is creating a health complex in the Lebanese mountains, and a vast resort near the Mediterranean with hotels, apartments, villas, a themed amusement park, a shopping mall and, inevitably, a golf course.

Syria is already richly endowed. A tourist can barely move without stumbling over Greek temples, Roman theatres, crusader castles or ancient Arab souks. The country offers huge rewards for westerners seeking the glories of the Orient. But do westerners visit? They do not. Over three-quarters of the country's yearly 2.5m visitors are from other Arab nations. They tend to be less interested in Syria's ancient heritage than in food, shopping and keeping the family amused. "We need to change our image," says Kasim Mikdad, the tourism minister.

His ministry is thinking big. By 2020 it wants the number of hotel beds increased from 35,000 to 175,000, allowing for 7m tourists a year. Licences for projects, it says, will now be granted in a fortnight; and tax breaks are readily on offer.

But, naturally enough, things do not always work out as smoothly as the plans. The people putting up a new four-star hotel in Damascus complain that it took six months to get the electricity supply connected and running, even though they had contacts at the highest levels. And most of the new cafés and restaurants that have opened in the spectacularly restored family palaces in Damascus's old city are operating without official licences, which means that they dare not display their menus to the public.

Middle Eastern peace might bring bands of monument-hunting, comfort-and-souvenir-seeking westerners. But since the auguries of peace are not propitious, the tourist ministry is looking local.

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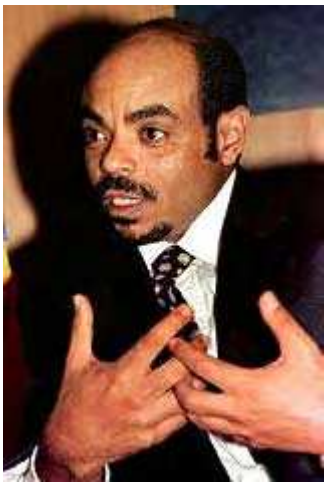
Ethiopia

Meles and the plotters

Mar 22nd 2001 | ADDIS ABABA
From The Economist print edition

EPA



Still on top, just

THREE months ago, when he signed the peace agreement that ended the border war between Ethiopia and Eritrea, Meles Zenawi had reason to be jubilant. He had won the war—costly, bloody and pointless as it was—and he had won a general election too. But Ethiopia's prime minister could now be fighting for his political life.

A faction within his Tigrayan People's Liberation Front (TPLF)—the dominant party in the ruling coalition—almost unseated him last week. For the moment, it appears that Mr Meles has prevailed. But so much is mysterious in the TPLF's secretive inner circles that nobody can be quite sure.

Mr Meles is a reformer, and the architect of Ethiopia's economic and political liberalisation. This is no mean achievement. During the long guerrilla war against Mengistu Haile Mariam, the TPLF was wedded to Marxist-Leninist dogma and admired the late Enver Hoxha, Albania's long-serving Communist leader. The Tigrayan militants supported Mr Meles because he delivered victories, seizing power from Mr Mengistu in 1991.

For much of the past decade, Ethiopia's economy grew impressively. The country became a favourite of western donors. But last year's food shortages exposed its structural weakness: it is still overwhelmingly reliant on subsistence agriculture and dependent on foreign aid. The stress of financing the war, combined with cuts in foreign aid, brought the economy to the brink of crisis. Mr Meles's medicine was more liberalisation. Acknowledging this, the IMF this week approved a bundle of measures involving $112m in aid over three years.

Political liberalisation has moved much more cautiously. Although his coalition, the Ethiopian People's Revolutionary Democratic Front, triumphed at last year's election, there was a significant turnout for the opposition parties, after a campaign that had seen some relatively free debate, especially in the capital, Addis Ababa. But real power remains firmly in Tigrayan hands.

Mr Meles banished his main critics back to Tigray some years ago. There, though forgotten by outsiders, they maintained their local power base within the unreformed Leninist apparatus of the TPLF. Some comrades, and their families, also grew rich on the pickings of party-owned businesses.

Thus, at this month's Central Committee meeting, when the prime minister proposed a crackdown on corruption and the reining in of TPLF-owned enterprises, a large minority rebelled. Led by Tigray's governor, Gebru Asrat, and a former defence minister, Siye Abreha, 12 of the 31 committee members attempted to remove the prime minister.

They accused him of being a stooge of Yankee imperialism, and argued that he had been soft on Eritrea. He should, they said, have continued the war, and overrun the country. Powerful figures in the TPLF stood by Mr Meles, notably the "father" of the party, Sebhat Negga, the foreign minister, Seyoum Mesfin, and the army chiefs. The 12 were suspended from their party posts.

This time, Mr Meles came out on top in a misty intrigue that left even senior ministers who are outside the Tigrayan cabal no better informed than their housemaids. But the dissident Tigrayans are not beaten yet.

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Slim green beans in the supermarket

Mar 22nd 2001 | BANJUL
From The Economist print edition

SATISFYING Europe's appetite for out-of-season vegetables has driven supermarkets to turn to Africa with its year-round growing cycle and low labour costs. African growers have more than met the demand, providing handsome profits for wholesalers and importers. But what has the trade done to African farmers?

Take two countries—Kenya and the Gambia—on either side of the continent, both of which have switched to non-traditional crops, and both of which have colonial links with Britain. But whereas Kenya has a vibrant horticultural export industry, the Gambia's is faltering.

Some 70% of Kenya's produce goes to British supermarkets. At least until last year's drought, exports of the slim green bean or *haricot vert* proved so lucrative that it was ousting tea and coffee. In the Gambia, however, global trade has left over 450 women's co-operatives embittered and impoverished. Having seen huge quantities of their produce left to rot on the airport runway, these women are now returning to the lower-paid but more reliable local market, with its own requirements.

Why should the two countries have had such different experiences? For a start, Kenya has a national airline offering ample cargo space on frequent international flights. The Gambia has a shorter flying time to Europe, but its co-ops have no regular means of moving freight. Moreover, its airport at Banjul has the reputation of being a transit point for West African drug gangs. This has led the British government to discourage Gambian imports.

Kenya also has the advantage of a successful marketing chain linking growers to agents, exporters and freight companies. Growing baby vegetables, such as dwarf beans, requires guaranteed markets for the season ahead. But the Gambia tends to rely on piecemeal arrangements and ad hoc purchases. Any rejection of consignments in Europe has a disastrous effect back home. Baby vegetables would be laughed off the stall if they appeared in local Gambian markets, where much mightier specimens are called for.

Most of the companies involved with growing and marketing in Kenya are Asian. Perhaps by coincidence, the Gambia's one success in this field is owned and run by members of an extended Asian family who have close links with Kenyan horticulture. But this is an exception that proves the rule that it is a dangerous business for small-scale African farmers to try to satisfy Europe's fad for tiny green beans.

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Stone age in the Nuba mountains

Mar 22nd 2001 | LUWIRI, SUDAN
From The Economist print edition

WOMEN dig in the sand of the dry riverbed, and after a while water begins to seep into the hole, forming a puddle. Scooping the precious stuff into gourds, they stride back up the hill. Under the blistering sun, the village of Luwiri looks as if it has been this way for centuries: the water drawn, the grain milled and the sesame pressed into oil, all by hand. Not so. Only a few years ago there was a diesel grinding mill, a motorised oil press, and the women pumped water from a drilled well, saving hours of hard work.

Since the civil war began 17 years ago, the Nuba mountains in central Sudan have been going back in time. Even “back to the stone age”, says Daniel Kodi, a Nuba native and founding member of the rebel Sudanese People’s Liberation Army (SPLA).

Meriedith Davenport

Survival

The war is partly about religion, with the Islamic, Arab-dominated government in the north fighting the non-Muslim, black African southerners. But the Nuba show the war’s ethnic dimension. Many of them are Muslim, but, since they are black, they feel they are not accepted. They threw in their lot with the SPLA in 1985, and the government has enforced its stifling blockade.

In Luwiri, this means that salt, sugar and clothing are rare. Machines have no fuel, or have broken down. Metal of any kind is scarce: farmers fashion their tools with scrap metal, a by-product of the frequent aerial bombardments. The only modern machines are the ubiquitous Kalashnikovs carried by the SPLA.

Despite the largest humanitarian airlift in history, little aid gets to the Nuba. The UN has been flying food into southern Sudan since 1989 under Operation Lifeline Sudan. But in order not to violate Sudanese sovereignty, the UN must have permission from the Khartoum government as to where it can drop supplies. The government does not let food into areas it is trying to capture from the rebels—and the Nuba mountains are one such area.

Over 1m people lived there in 1985, says the United States Committee for Refugees, an NGO in Washington, DC. About 300,000 are still in the mountains today. In 1998 the Sudanese government and the UN agreed on a plan to begin flying food in. But this has not even begun to happen.

The few, non-UN relief flights that break the government embargo bravely fly a trickle of food and other supplies to a clandestine airstrip. Advised by rebel radio that such a flight is coming in, people from across the Nuba walk for several hours, or several days, to the airstrip, and wait. The aircraft tumbles along the pitted runway, is quickly unloaded, and departs. “We are a big target,” says a crew member as he steps up into the plane. “And there’s a government garrison just over the hill.” The few tonnes of food these pilots unload in the area every month or so disappear like rain on parched fields.

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South Africa

The plague

Mar 22nd 2001 | JOHANNESBURG
From The Economist print edition

A QUARTER of a million South Africans were killed by AIDS last year. According to official figures released on March 20th, the epidemic is getting worse. Last year, roughly 4.7m South Africans—one in nine—carried the human immuno-deficiency virus (HIV), which causes AIDS. This is 12% more than in 1999. Since almost half of the population is too young yet to be at much risk, the true picture is even grimmer.

The data are derived from tests performed on expectant mothers in public ante-natal clinics. This gives a rough proxy for HIV prevalence among sexually active adults. The latest survey found that 24.5% of women so tested were HIV-positive, up from 22.4% in 1999. Noting that the rate of increase has slowed in the past three years, the health minister, Manto Tshabalala-Msimang, said she hoped that HIV prevalence was stabilising. Maybe, but in KwaZulu-Natal, the worst-affected province, a staggering 36% of pregnant women tested positive. By the gloomiest projections, half of the population will eventually die of the disease.

In the face of this disaster, the government dithers less than it used to. In some hospitals, drugs are now provided to prevent mothers giving the virus to their unborn babies. The government's threats to ignore drug patents have persuaded western drug firms to offer pills that prolong AIDS patients' lives at little more than they cost to manufacture. They are still too expensive to be offered to all who need them, but it should be possible to help a substantial number.

Efforts at prevention, too, have improved. Three years ago, the anti-AIDS campaign was invisible. Now, there are gaudy posters on city billboards, explicit educational programmes on television, witty warnings on minibus taxis, and pamphlets explaining how to have fun without penetration. The main targets of these warnings are youngsters who are not yet sexually active. If they can be persuaded to stay uninfected, a generation could be saved.

There is some evidence that the warnings are being heeded. A 1998 survey of young women found that only 16% said they had used a condom during their last sexual encounter outside marriage. In a survey last year, a more encouraging 55% of young South Africans said they always used condoms. But such surveys have to be treated with caution: people do not always tell the truth about their sex lives.

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Nigeria

Fuelling trouble

Mar 22nd 2001 | LAGOS
From The Economist print edition

THEY live in Africa's biggest oil-producing country but Nigerians are always short of petrol for their cars. The subsidised petrol price is so low that local producers have no incentive to refine their oil. Faced with a perennial fuel crisis, the government is talking of deregulating the market. The result, this week, was country-wide protest rallies, organised by the main trade union.

AP

Buy our (perhaps) pure petrol

Filling your petrol tank in Nigeria is a battle of guile or endurance. Most petrol stations are (or claim to be) short of the stuff that they are required to sell at a fixed pump price of 22 naira (18 cents) a litre, a third or less of the price charged in neighbouring countries. The stations that admit to having fuel are besieged by queues. If you do not want to wait for up to 48 hours, you bribe or bully your way to the head of the line.

Alternatively, you fill up your car at the roadside, buying on the black market from someone offering what you hope is unadulterated petrol in a jerry can at several multiples of the official price. People then travel with these hoarded cans in the back of their cars, risking a blaze if they have an accident.

The fuel shortage is the most urgent problem currently facing President Olusegun Obasanjo. It is a huge political irritant, and it hurts the economy. Employees spend hours of their working time in queues. Goods do not get to their destinations on time and transport is clogged up.

The government claims to have spent over $1 billion last year importing fuel to sell at the subsidised price. But much of this was either promptly smuggled abroad, to Benin, Niger or Cameroon, or sold on the black market inside Nigeria, at anything from 40 to 70 naira a litre. Last year the government tried to raise the subsidised price from 20 naira a litre to 30 naira. But, after a five-day strike, the authorities backtracked, bringing the price back down to 22 naira.

Now, the talk is of deregulation. In a report released last month, the government suggested ending subsidies in phases over a period of 18 months to two years. It argued that only if companies set their own pump prices, and compete, would there be an incentive to refine fuel and sell it at home.

But public opposition to deregulation is intense. On radio talk-shows, thousands of callers criticise the plans.The mass rallies organised by the Nigeria Labour Congress, which began on March 20th, are a signal of the way people are thinking. Any actual attempt to raise prices would almost certainly provoke a general strike, which could turn violent. The government is justifiably nervous. Its support is patchy, and democracy remains fragile. Mr Obasanjo has to weigh the impact of deregulation on his own chances of winning the next presidential election—which is due in 2003.

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Burundi

Talking peace and waging war

Mar 22nd 2001 | BUJUMBURA
From The Economist print edition

AS THE latest round of talks to end Burundi's seven-year civil war got under way this week in the Tanzanian town of Arusha, the negotiators squabbled over who should lead the proposed transitional government. They are supposed to agree on a Tutsi president and a Hutu vice-president for the first 18-month phase of the three-year transition. For the second phase, the two will swap roles. The largest of the ten Tutsi parties supports Burundi's current president, Pierre Buyoya. But eight of the other Tutsi groups now back Colonel Epitace Bayaganakandi, a former interior minister.

Time is running out for Mr Buyoya. At Arusha, some 17 of the 19 parties and institutions taking part in the negotiations now refuse to have him serve as president. As a way out of humiliation, he is being accused, by his Tutsi critics, of planning to declare a state of emergency. He would thus delay a peace agreement, and the subsequent setting up of a transitional authority. All in all, there is deep scepticism about the chances of the talks succeeding.

The background to the infighting in Arusha is the real fighting in and around Burundi's capital. Bujumbura is a city riven by ethnic hatred. A literate inhabitant can write H for Hutu or T for Tutsi next to the name of any quarter on a detailed map. A rebel attack on the northern districts of the city three weeks ago left heavy casualties and widespread damage. In response, the armed forces staged a clean-up operation in the rebel stronghold of Gassarara, a town in the hills five kilometres (three miles) to the east of the capital. There has also been firing in Tenga, a thick forest outside the city which the rebels use as cover.

Army leaders see the recent escalation of violence as a direct consequence of the first, timid, signs of peace in neighbouring Congo. A continuation of both Burundi's and Rwanda's civil wars was being fought on Congolese territory, and was indeed part of the war there. If there is peace in Congo, the rebels from both countries are likely to take their wars back home.

When he visited the scene of the recent fighting in Bujumbura, Burundi's defence minister, Cyrille Ndayirukiye, stressed that any Congolese deal could spell trouble for Congo's smaller neighbours. He claimed that the commanders of the latest rebel attack on Bujumbura were not Burundian but Rwandan—a mixture of the *Interahamwe*, the militia that carried out the 1994 Rwandan genocide, and members of the old, unreformed Rwandan army. Both groups have been fighting in Congo, alongside one of Burundi's main rebel groups, the Forces for the Defence of Democracy (FDD), on the side of the Congolese government.

Military sources in Congo's eastern Katanga province say that FDD members may now be working their way back through Congo into Burundi. The Rwandan rebel groups may be following the same path. If true, this is bad news for both countries.

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OPINION

Innovation at the edge

Mar 22nd 2001
From The Economist print edition

Technology has done a U-turn, dispersing control of large networks from the hub to the edge. Lucky us

SINCE its emergence in the 19th century, modern technology has been a centripetal force. Innovations have been pushed from the periphery to the centre, from the small to the large, from a personal preoccupation to the prerogative of the enterprise—as one emerging industry after another sought to capitalise on economies of scale. Michael Faraday's tinkerings with electric generators led to the electricity grid. Alexander Graham Bell's exclamation ("Mr Watson, come here—I want to see you") was the starting point of the seamless telephone service that now straddles the globe. Without such concentrations of capital and control in large, central, vertically integrated organisations, the astonishing economic growth of the past century would have been impossible.

But the confluence of deregulation and privatisation during the tail-end of the 20th century has reversed that. No question that technology is now driven by a centrifugal force, pushing power out from the centre to the edge. Arguably, it started with the development of the personal computer more than two decades ago. More precisely, it was the introduction of the client-server style of computing in the late 1980s that put networked processing power on people's desks, freeing them to use their own initiative. This dispersal of control to users on the network's edge cut out whole layers of middle managers whose job had been to shuffle questions and answers between bosses and staff. That was the start of the productivity boom that America enjoyed in the 1990s.

A similar centrifugal force is beginning to rewrite the rules of energy production. As energy markets liberalise, small, local power plants are springing up to offer neighbourhood users cheap electricity, thanks to not having to pay for distribution over a wasteful national grid. An added advantage of so-called "micropower" is that it is much friendlier to the environment as well. All the more so when it is based on fuel cells that convert hydrogen direct to electricity without combustion. This issue's story on fuel cells (see article) notes that the hydrogen-powered car could even be a source of income for its owner. Humming quietly away at home when not needed for anything else, the car's fuel cell could feed emission-free electricity back into the grid via a power socket on the garage wall.

But the most powerful centrifugal force at work today is the one that is remaking the telephone system in the image of the Internet. As the ultimate expression of technological bureaucracy, nothing compares with the complexity of the telephone system's vast, centrally controlled, five-tier hierarchy of switching centres. The story on "Voice over Internet Protocol" (see article) tells how, out of necessity, the telephone carriers are adopting the same packet-switching techniques that made the Internet such a user-friendly and innovative phenomenon. The attraction is that the new "SIP" phone, which is helping to propel this revolution along, takes control for setting up all the telephone services (and more) that a customer may need out of the hands of the carrier's central office and places it firmly in the hands of the user instead. Industry watchers see this as being an even bigger technological disruption—and greater market opportunity—than the emergence of the PC.

Internet telephony could have happened five or more years ago. The technology was mostly in place, but the economic, social and political conditions were far from ripe. It is a reminder of the "better mouse-trap" myth. Innovation may be essential for the creation of a new market, but it is never the sole requirement. The world will not beat a path to an inventor's door if the market conditions are not ripe.

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Economist.com PRINT EDITION TECHNOLOGY QUARTERLY

MONITOR

Biochips down on the farm

Mar 22nd 2001
From The Economist print edition

When this biochip is available, regulators will have a quicker, cheaper and more reliable way to detect the presence of genetically modified food

LAST autumn, Friends of the Earth, an environmentalist group, sent an assortment of foods to the testing laboratories of Genetic-ID, a biotechnology company based in Iowa. After $7,000-worth of DNA tests, Friends of the Earth—which is opposed to the use of genetically modified (GM) foods—got the result it was hoping for. One of the products, some taco shells made by Kraft Foods, turned out to contain StarLink, a GM maize that had not been approved by America's Food and Drug Administration for human consumption.

The revelation wrought havoc on the year's maize harvest and on the bottom line of Aventis, StarLink's manufacturer. Across America, tortillas, tacos and other maize- based foodstuffs had to be withdrawn from grocery shelves. Meanwhile, shipments of freshly harvested maize had to be tested and certified as safe—or else converted into animal feed. The cost to Aventis: an estimated $500m.

The StarLink incident highlighted an important practical detail of this controversy: that testing for GM food is still likely to be a hit-and-miss affair. Currently, the tests used to detect StarLink in the field employ colour-changing strips, which rely on technology that is similar to the sort used in home pregnancy kits. Such strips can test for the presence of only one kind of genetic modification at a time (in this case, StarLink) and cost about $10 each. Moreover, they cannot quantify the amount of GM material present in a sample. They merely indicate whether it is present or absent above a certain level—usually at 1% of the sample.

These tests may be adequate to assure that no unsafe products enter the human food supply. But if GM labelling is to mean anything, someone will have to come up with a fast, affordable and reliable test that can trace the presence of a broad variety of GM ingredients. And the tests will have to work with samples taken from foodstuffs anywhere along the supply chain—from raw grain to packaged product.

GeneScan-Europe, a biotechnology company based in Freiburg, Germany, believes it has the answer in the form of an electronic biochip called "eSensor". Developed by a division of Motorola called Clinical Micro Sensors based in Pasadena, California, the eSensor is a small circuit-board laced with up to 36 gold electrodes. Each of these is linked to more than a billion identical single-stranded DNA molecules, and each DNA strand is attached to a kind of electrically conductive carbon compound known as a ferrocene molecule.

The DNA molecule at an electrode corresponds, by the genetic-letter-matching rules that are the basis of heredity, to particular fragments of DNA found in genetically modified crops. When a strand of DNA comes into contact with its complementary target, the two bind together. This reaction holds the ferrocene molecule close to the electrode's surface, where it changes the current passing through an electrode. A device measuring this current can then be used to gauge what kind of DNA has been detected, and thereby estimate how much of it is present in the sample.

The device is already available for use in the laboratory but still needs more work before it will function effectively in the field. Currently, a sample must undergo a lengthy chemical preparation before testing. Its DNA has to be extracted and then replicated so that the eSensor may detect it more easily. Clinical Micro Sensors hopes to replace this step with a microfluidic system which will prepare the sample and replicate the DNA automatically—all within an hour.

The next step will be to couple the system with a detector in a hand-held device that can be used "truck side"—ie, as the food leaves the field after harvesting. Such devices ought to be able to detect DNA present in as little as 0.025% of a sample. And since eSensors can detect many types of DNA at one go, a sample of grain or processed food need be tested only once to be screened for several dozen different

kinds of genetic modification. Sounds ideal for European countries that are keen to make such testing mandatory.

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REPORT: MEDICAL TECHNOLOGY

The cutting edge of virtual reality

Mar 22nd 2001
From The Economist print edition

Forget blood and guts, tomorrow's medicine is all about robotics, augmented vision and creating VR images of the body

Microvision

VINNY, with his shiny dark hair and unreal tan, is lying on a hospital trolley dressed in a lightweight green surgical gown. A young woman listens to his heart as his chest gently rises and falls. He blinks, and his pupils dilate, as a bright light is shone into his blue eyes. Adjusting Vinny's head, she pushes a plastic breathing tube into the back of his mouth, past his vocal cords and into his lungs. To her satisfaction, a light breeze flows in and out of the end. Then, she strips back his gown. There is a large, loose, rubbery flap of skin just above his pubic bone. She peels the flap back. Underneath is a mess of electrical wires and rubber plumbing.

Forget blood and guts, tomorrow's medicine is about bits and bytes. Vinny is a humble digital mannequin, designed to simulate trauma (and if necessary death) for his military buddies to practise on, but he was only a small part of the technology on show in January at Medicine Meets Virtual Reality in Newport Beach, California. Doctors, engineers, computer scientists, military men and an assortment of researchers met to discuss computer-based tools for medical diagnosis, training, telemedicine, image-guided and minimally invasive surgery.

Robot assisted, and computer enhanced, surgery is a rapidly moving field. Techniques already arriving in surgical theatres include robotic keyhole surgery on the heart. Much research is focusing on improving current practice—say, by taking blood samples more accurately using a robot—as well as overcoming problems in areas such as microsurgery. Robotics is set to push forward the frontiers of what is humanly possible, even under a microscope.

Although microsurgery is currently used in a wide range of operations, including limb reattachment and reconstructive plastic surgery, it is difficult and not always successful. And there is a lower limit to what is operable because of hand tremor, the control of forces and the fundamental limits of co-ordination and positioning. Below a millimetre in size, vessels and nerves are difficult to repair, and the very smallest cannot be reattached. This is a particular difficulty in finger reattachment in children, where the sutures can be a third to two-thirds of a millimetre in size. As more successful anti-transplant drugs arrive, a way must be found to reconnect the tiniest of vessels if limb reattachment is to become a routine operation.

"Many VR helmets give a narrow view of the world—like watching a mini–TV through a cardboard tube."

Pablo Garcia and his colleagues at SRI International in Menlo Park, California, are developing a robot which mimics the surgeons' hand movements with standard surgical tools, but on a smaller scale. The system also filters tremor and magnifies the force feedback surgeons receive, so they can get a better feel for the fragile and minute structures they are working on. The system is at an early stage, and animal tests show that dexterity and precision still need improving. But Mr Garcia says that if they can overcome these problems, clinical applications could be only three to five years away. Another way of tackling the human limitations to surgery is by developing intelligent tools. The Centre for Medical Robotics and Computer-Assisted Surgery at Carnegie Mellon University in Pittsburgh is developing a tool for eye microsurgery that can filter tremor, jerk and low-frequency wander.

Beating heart

Surgery on beating hearts is also beginning to look possible. At the University of Tokyo, Yoshihiko Nakamura and Kosuke Kishi are working on a system that creates a stabilised image of a beating heart and a tool that translates surgical manoeuvres to compensate for the movement of the heartbeat. The principle is simple. Say someone were to wave a printed article from side to side in front of your eyes, one of the ways for you to read the now-blurred image would be to move your head in synchrony with the movement. The image on the page would then appear to be static. The camera developed by Dr Nakamura and Dr Kishi does exactly this, by tracking heart movements.

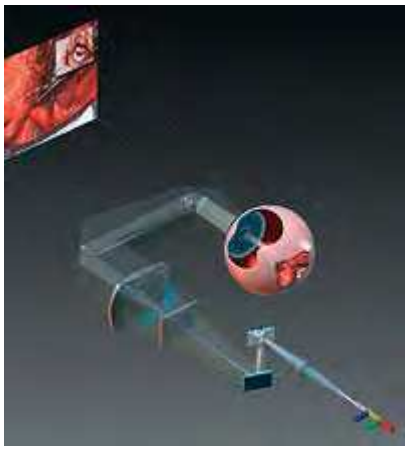
Image stabilisation has been combined with a slave robotic surgical instrument that compensates exactly for the movement of the heart. When the surgeon wants to make a small downward incision, the slave robot makes the movement—plus whatever extra amount the robot calculates is needed to compensate for the movement of the heart. On the monitor, what the surgeon sees is a stable image of the heart and the instrument. Meanwhile, the robot is making rhythmic motions like a conductor keeping time to the music. Dr Nakamura says the system's performance is promising. And if tests on animals work, it is of potential use in minimally invasive coronary-bypass surgery—a difficult, highly skilled, but desirable technique for reducing patient damage during surgery.

The guiding hand

Imaging—such as ultrasonic scans, computed tomography (CT), magnetic resonance imaging (MRI) and fluoroscopy—allows surgeons to visualise and plan surgery accurately, leading to a decline in exploratory surgery. By combining imaging during surgery with robotic assistance, it is hoped that incredible precision will be possible on areas of the body which are normally difficult to get at. At least two separate teams, one at Georgetown University Medical Centre in Washington, DC, and another at the Fraunhofer Institute for Biomedical Engineering in Saint Ingbert, Germany, are attempting to develop a system which uses robotics and image guidance to place needles precisely in the spine. That requires movements accurate to a fraction of a millimetre. This year, the Georgetown team is to start clinical trials of its robotic needle.

A group at the Applied Physics Laboratory at the University of Washington, Seattle, has ideas for developing its portable ultrasound unit. This is already a huge (and commercial) advance over existing fridge-sized ultrasound units, and means that diagnosis of all kinds of internal injuries can be taken into the field. The group is working on a way of making a unit that will both see, and then treat, internal bleeding. The prototype has added "high-intensity focused ultrasound" (HIFU) to the portable ultrasound detector. HIFU can rapidly heat small regions beneath the surface of the skin, and seal off areas of bleeding in a fraction of a second. The idea is to give patients enough time to reach hospital in cases when their injuries would otherwise cause them to bleed to death before they arrived.

Microvision



Eyes to the future: retinal scanning displays draw an image directly on to the retina with a low-powered laser

Further down the line is "field induced suspended animation". Suspended animation is a type of hypothermia already employed during some specialised types of surgery. Cooling the body slows the metabolism, reducing the brain's need for oxygen. The technique is used during some types of cardiac and neurovascular surgery, when the patient's blood is taken out of the body to be oxygenated (a cardiopulmonary-bypass) and there is thus a risk of oxygen deprivation.

Lyn Yaffe of the IIT Research Institute in Rockville, Maryland, says that if the brain and heart, the critical organs, could be cooled in the field, it would be possible to preserve life in emergencies such as massive bleeding, shock and cardiac arrest, in which the blood flow is temporarily halted. Currently, teams are working on developing a system that relies on portable visualisation, image guidance and some automation to introduce cooling fluids into the aorta (the body's main artery) while vital signs are monitored. Researchers say that what sounded far-fetched until recently, now looks feasible, and could conceivably be in ambulances in five years.

Sight for sore eyes

The growing use of imaging in medicine is creating a mountain of data, as well as the pile of pre-

operative data, images and planning notes, that surgeons may wish to refer to during surgery. It is increasingly common for surgeons to have to turn away, or even move away, from a patient in the operating theatre to check details such as pictures taken before or during an operation. Many groups are working towards a solution of adding information to the surgeon's vision. This so-called "augmented reality" is a halfway house between virtual reality (VR) and, well, reality. Virtual reality is the use of computer modelling to enable a person to interact with an artificial (usually three-dimensional) environment. Augmented reality means augmenting a view of the real world with data and images, much like the head-up displays used by modern fighter pilots.

Microvision

Charles Steiner and his colleagues at the Cleveland Clinic Foundation in Ohio are working on a "unified interface" for surgeons to allow them access to a patient's critical information during surgery. Although this could be presented on a TV monitor, they are planning to use a full-colour, head-mounted augmented reality display which, they predict, will be commercially available later this year. What is unusual about the display is that the image is beamed direct into the eye.

Such virtual retinal displays were invented by researchers at the Human Interface Technology Laboratory at the University of Washington in 1991, and are being commercialised by Microvision in Bothell, Washington.

The beauty of a retinal scanning display (RSD) is that the image is drawn directly on to the retina of the eye by a low-powered laser scanning backwards and forwards. Because the laser moves so rapidly, the human visual system sees a complete and stable image. This system's biggest advantage is that because there is no external image, no fancy external display unit is needed. That has enabled Microvision to build a small head-mounted RSD unit that uses little power and gives an impressively wide 120° field of view. Many VR helmets give a narrow 25° view of the world, and are like watching a mini-TV down the end of a cardboard tube. More than twice this angle is needed to fill a person's normal field of vision.

And because the image in retinal scanning is not created on an external screen in the usual way, there are no picture elements, ("pixels") to contend with. So the resolution of the image in the eye is not limited by the number of pixels used by a display screen, but depends simply on the precision of the laser light source.

Closest to production is the monocular, single-colour Nomad display that projects an image into a single eye—rather like the display worn, in real life, by pilots who fly certain military helicopters. The effect this has on vision is similar to the robot vision shown in the film "The Terminator", played by Arnold Schwarzenegger. The robot can see a glowing list of options displayed in its field of vision, superimposed on its view of the real world beyond.

Microvision expects to start shipping the single-eye of the Nomad display this summer. But surgeons are likely to wait for the full-colour, binocular version, which will be better for viewing medical images. Besides, seeing an image superimposed over a single eye can be more than a little disconcerting because of the "image rivalry" set up between the assisted and unassisted eyes. But, whether for one eye or two, an interesting advantage of RSD in medicine is that, coupled with a head-mounted video camera, such displays can give other people—specialists and medical students, for example—access to the primary surgeon's computer-enhanced viewpoint, even when the audience is in another building or another part of the world.

Microvision

Augmented reality will allow surgeons to look at images

A unique feature of RSDs is that because they project an image on to the retina, they can be used equally well by people with eye defects such as short- or long-sight. In particular, they produce clearer-than-normal images for those who are affected by age-related defects of the eyes. Telesensory, a company based in Sunnyvale, California, that specialises in products for people with poor vision, has ordered ten Nomad units from Microvision for evaluation. The units currently cost $10,000 each, but this is expected to drop significantly once they are in full production. While the head-mounted display is rather bulky, Microvision expects that, within five years, the device will be little bigger than a pair of spectacles.

Whatever the system used to display it, most experts agree that

and data during surgery, without having to turn away from the patient

augmented reality is going to be invaluable in delicate procedures—such as the removal of brain tumours—where the slightest slip could harm the patient. Here, a group at Wayne State University in Detroit, Michigan, is working with NASA on one of the trickiest of problems: correctly superimposing images of anatomical structures and brain tumours on to a camera's view of a surgical procedure.

Teacher's pet

Experts agree that the use of virtual reality, augmented reality and other simulation techniques is going to pay huge dividends in training surgeons and dentists. One virtual-reality training system has even been developed to teach surgical trainees how to set up an operating room properly for different types of surgery—a real benefit, as operating theatres cost around $30 a minute to run. And many of the new VR training systems include devices such as scissors and drills which, like video games, provide force-feedback. Trainees can feel what it is like to puncture an abdomen with a needle, collect bone marrow for transplant (difficult for the surgeon and often painful for the patient) or even drill into healthy and diseased parts of a tooth. Trainees can practice as many times as they like, and get feedback and precise measurements of their skill.

Much of this medical technology is being driven, and paid for, by the armed forces. But the difficulties of working under combat conditions means that it is likely to be used first by civilians. In the near future, advances in medical simulation will most certainly improve the accuracy and success of different types of surgery.

Eventually, as robotic tools are improved and made smaller and more dextrous, difficult techniques—such as neurosurgery and whole limb transplants—will become routine. And entirely new kinds of surgery, including operations on fetuses, will be possible. Meanwhile, the growing digitisation of the blood-and-guts business will allow medical technology to become increasingly distributed. Coupled with the falling price of broadband communications, the new imaging technologies should usher in an era when telemedicine and the sharing of medical information, expert opinion and diagnosis is common.

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MONITOR

Designer enzymes

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A powerful new technique will let drug firms bypass evolution and design enzymes on a computer

RESEARCHERS have long puzzled over the problem of how to design enzymes—the protein catalysts that accelerate chemical reactions in living cells. Evolution took millions of years to create these vital proteins, which are involved in almost every chemical pathway in living things. Recently, however, Stephen Mayo and Daniel Bolon of the California Institute of Technology in Pasadena unveiled a technique that allows them to bypass evolution and design an enzyme on a computer.

The method, announced at the American Biophysical Society's 45th Annual Conference in Boston, will have drug companies rubbing their hands. The processes used to make complex pharmaceutical compounds often do not have naturally occurring enzymes to speed them up. Since the greatest cost in manufacturing drugs is the synthesis, the design of novel enzymes could save time and money. And the method could also allow researchers to modify known enzymes to make new and better drugs.

Every chemical reaction involves transient states that flit in and out of existence before the final products are bound in a steadfast embrace. The rate at which these fleeting intermediate steps happen controls the rate of the entire reaction. A catalyst works by being an attractive option for stabilising those transient states, so accelerating the formation of products.

The question is: can you design an enzyme for a specified reaction? In other words, can you compute an amino acid sequence that is capable of speeding up the formation of known chemical intermediaries while at the same time ensuring that the molecule will indeed fold into a shape that gives an enzyme its catalytic properties?

According to Dr Mayo and his colleagues, the answer is yes. They have devised a computer technique that can investigate the possible sequences of, say, 100 amino acids and score them according to a set of rules, the sequence with the highest score being the winner. The first rule is that the sequence must lower the energy barrier to the formation of intermediate states—ie, behave as a catalyst. Other rules ensure that the enzyme can fold up in a biologically plausible way. For example, because positively charged chemical groups repel, they cannot sit next to each other. Likewise, no two atoms can occupy the same point in space. And those amino acids which dislike water must sit towards the middle of the structure, while those with an affinity for water reside on the outside.

The problem is that if you have a chain of 100 amino acids, with one of the 20 amino acids employed to make natural proteins at each position, there are 20 raised to the power of 100 combinations of possible sequences—a number that is billions of billions times higher than the number of particles in the universe. It is impossible for a computer to calculate the scores for such a number of combinations.

Fortunately, help is at hand in the form of the "dead-end elimination theorem", similar in spirit to the method employed in the software that IBM's "Deep Blue" computer used to beat Garry Kasparov, a Russian grand master, at chess. The theorem allows Dr Mayo to compare the score of an amino acid at the first position on the chain with the score of amino acids at subsequent positions on the chain, keeping only the best answer. This allows a systematic reduction in the complexity of the calculation, by throwing away many of the wrong answers right at the beginning.

Having invented their method, Dr Mayo and Mr Bolon had to test it. To do this, they chose a well understood reaction, the breakdown of a compound called p-nitrophenyl acetate in water. As a starting point for the design, they picked a known protein backbone with no catalytic effect called thioredoxin. This was chosen because it is small (a chain of 108 amino acids) and stable. Then they used their program to modify thioredoxin's amino acid sequence until a new protein with enzymatic activity emerged.

Having computed this sequence, the next job was to manufacture it—which they did by inserting an appropriate piece of synthetic DNA into a bacterium and allowing the bug to multiply. Next, they purified their freshly produced enzyme and tested its catalytic power.

The enzyme speeded up the reaction by 200 times—which, compared with naturally occurring enzymes that make reactions go between 10,000 and 1m times faster, is hardly spectacular. But that is not the issue. The real point is that a technique has been found that can turn any protein into an enzyme. The next step will be to refine the computational methodology so as to improve the enzyme's activity and to examine more interesting reactions. "For example, if I could design an enzyme that hydrolyses HIV protease at specific points in its chain, I would have a treatment for AIDS," explains Dr Mayo.

Dr Mayo and a former student, Bassil Dahiyat, have set up a company, Xencor in Monrovia, California, to market this and related technology. Recently, Xencor raised an additional $50m to support such efforts.

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TEAM SPIRIT

Have legs, will run

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Starting with this issue, we will take a regular look at outstanding teams that are bringing new technologies to the market—to see how they manage innovation

THE lone scientist or maverick engineer pushing back the limits of man's ignorance has a grip on the popular imagination. But with all respect for the Einsteins and Edisons of the world, many technological breakthroughs these days come through the dedicated efforts of teams of researchers. And for high-tech companies, getting such teams to reach a seemingly impossible goal is much more challenging than simply nurturing an individual with a high IQ.

Point of a new memory device

As a case in point, consider the IBM Research Laboratory in Zurich, where an unusual team effort has created an ingenious memory device. The "millipede", as it has been aptly named, relies neither on magnetic nor electronic means to store digital information. Instead, it uses 1,000 microscopic levers that record information by making minute marks on plastic.

The story behind the millipede team says much about how IBM has changed over the past few years. The Zurich laboratory had the singular honour of producing two Nobel-winning breakthroughs in the 1980s. But when the once-indomitable Big Blue found itself struggling to compete in the mid-1990s, even its most illustrious research divisions were asked to start making a contribution to the company's bottom line.

Gerd Binnig, one of IBM's Nobel-prize-winning inventors, was fascinated by the potential of micromechanical devices for computing. Peter Vettiger, who worked in another department but played soccer with Dr Binnig, had independently developed similar interests. It was only a matter of time before they were pooling their thoughts on how to turn micromechanical levers into something that would excite IBM's product managers.

The obsession with micromechanical levers was no coincidence. Such devices were already used to make atomic force microscopes (AFMs), which Dr Binnig had invented (his Nobel was for a cousin of the AFM called the scanning tunnelling microscope). An AFM can detect—and even manipulate—single atoms on a surface of a material, using a sharp tip on the end of the lever to scan the surface delicately like a gramophone needle on a vinyl record. Using such tipped cantilevers to store data was an obvious application. So obvious, in fact, that others were already doing it. Researchers at Stanford University in California were developing a comb-like row of AFM levers etched on to a silicon chip as a tool for making incredibly small semiconductor devices.

The trouble with such efforts, reasoned Dr Binnig and Dr Vettiger, was that the steady progress in conventional magnetic storage devices would probably render them obsolete before they could be industrialised. So instead of using just one AFM or a handful in a row, they decided to make a chip with 1,000 AFMs in a square array—more like a brush than a comb (see illustration). Shunning a gradualist approach was definitely a big gamble. But it was the only way to give a new micromechanical storage device a big enough technical edge over the ever-improving magnetic storage systems.

At its start in 1995, the millipede project was "blue sky" research based on a bold— some critics said crazy—technological vision rather than any clear market need. Being in Zurich, half a world away from IBM's data-storage laboratories in California, no doubt helped shelter the fledgling millipede project during its critical proof-of-concept phase. To experts in the field, such a "disruptive" storage technology seemed threatening, even absurd.

Yin-yang relationship

Such entrenched opposition could have been fatal. Luckily, the millipede team had strong backing from the local management in Zurich and IBM's research barons in America. At its core, the millipede team was a carefully balanced yin-yang relationship. Dr Binnig was the out-of-the-box thinker who would rush to the lab to test a new idea with a soldering iron. Dr Vettiger, the experienced team leader, appreciated the rigorous long-term planning needed to bring a new microchip design to fruition. One side focused on AFMs, while the other mastered the microtechnology of silicon.

To make this yin-yang approach work, each side of the team had to learn from the other. Ute Drechsler, a process engineer who came to the project from an IBM production plant in Germany, remembers how weird and disorganised her colleagues seemed at first. But she soon learned to enjoy a style where she was expected actively to acquire knowledge from team mates, rather than passively wait for instructions. Ms Drechsler's damn-the-torpedoes attitude to fabricating a working version of the millipede contrasts with that of Urs Dürig, a hard-core physicist who became known for his careful experiments and deep thoughts about the molecular-scale mechanics of how the tips make marks on the plastic. Yet Dr Dürig's approach also had a big influence on the design of the device.

Outside criticism of the project (of which there was no shortage) helped knit this diverse team closer together. All the time, the mantra of the millipede team was "keep it simple". One instance was when the team was wondering how to ensure that all the tips of the 1,000 micro-levers would make contact with the surface they were supposed to record on. A table wobbles if one of its four legs is shorter than the others, so the chance of having a serious micro-wobble problem with 1,000 legs seemed immense. The obvious answer was to build into the chip some means of adjusting the height of each leg independently. But this would have added to the chip's complexity. The team opted instead to make a test run on a small set of levers. It turned out that the wobble problem could be tamed by careful manufacturing rather than added control systems.

Last year, the millipede team demonstrated its first chip with 1,000 levers, showing that the device could store data on a plastic surface, read it back and erase it if need be. IBM has now decided to go for the next stage of the project, which requires building a complete storage device. This will mean expanding the team to include researchers from signal processing as well as support from the storage-technology laboratories in America.

There is no guarantee that the millipede team will succeed in this next phase. But at least now a market for the device is coming into focus—low-power memory for mobile devices. Having to move only microscopic parts rather than rotate the large disks required for magnetic storage saves energy. Confirming the millipede's potential, competitors such as Hitachi, Samsung and Hewlett-Packard have launched their own projects to build micromechanical storage systems. If IBM can manage the rest of the innovation chain as well as it has done the invention bit, then millipede memories could be in consumer products by 2005.

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REPORT: EVOLVABLE HARDWARE

Machines with minds of their own

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Left to evolve on their own, certain machines can learn to be smarter—surpassing even humans in some of the most intellectually demanding of tasks

CAN people build machines capable of evolving into something better—able, perhaps, to invent solutions beyond human imagination? Using brute-force methods of calculation, computers can nowadays play a passable game of chess. In 1997, an IBM supercomputer called Deep Blue defeated Garry Kasparov. The world champion described the experience as being every bit as gruelling as playing a top-notch human challenger. In so doing, Deep Blue satisfied at least one of the criteria for artificial intelligence set in the 1950s by Alan Turing, the mathematical genius behind the Enigma code-breaking effort in wartime Britain.

Yet Deep Blue's victory left the world's artificial-intelligence community unimpressed. That was because the machine performed its feat merely by crunching numbers faster than any other computer had managed before. Its enormous processing power enabled it to predict a game's possible course up to 30 moves ahead, while its clever programming allowed it to work out which of the millions of possible moves would strengthen its position best. On its own, all that Deep Blue could do—and do brilliantly—was the mathematics. What it could not do was devise its own strategies for playing a game of chess.

Self improvement

But what if Deep Blue could have been given the ability to evolve and learn to improve itself using its trial-and-error experiences? A new technology called "evolvable hardware" (EHW) attempts to do just that. Like Deep Blue, EHW seeks solutions through trying billions of different possibilities. The difference is that, unlike Deep Blue, EHW continually crops and refines its search algorithm—the sequence of logical steps it takes to find a solution. It selects the best each time and tries that. And it does all this on its own accord, not according to some programmed set of instructions.

Conventional wisdom has long held that a machine's abilities are limited by the imagination of its creators. But over the past few years, the pioneers of EHW have succeeded in building devices that can tune themselves autonomously to perform better. In some cases, the mechanical progeny appear to outstrip even their creators' abilities. In the field of circuit design, for instance, EHW is coming up with creative solutions to problems that have defied human beings for decades.

"Evolvable hardware can exploit the physics of materials in ways researchers do not even understand."

The first thing EHW needs is for the hardware in question to be reconfigurable. There is no way that a device can evolve if it cannot change its shape or way of doing things. Take a Swiss Army knife. Given the task of, say, opening a bottle, the user identifies the correct tool in the knife, opens it, and thereby transforms the device into an implement that can pry off a bottle cap.

In this case, the actual customisation is crude: no matter what the size and shape of the bottle cap, the shape of the bottle-opener does not alter. For a Swiss Army knife, the "program" (the decision about which implement to use) can be adapted, but the "hardware" (the bottle-opener) cannot. What EHW engineers are trying to do is invent a knife that can customise its shape to any bottle cap—and perform this adaptation on its own recognisance.

The trick with evolvable hardware lies in creating a device that knows how to make the correct structural adaptation at the correct time. To search out the best-suited design, engineers make use of a programming tool called a "genetic algorithm"—a software technique that deploys trial-and-error learning to mimic the process of natural selection that powers evolution in the living world.

The first step that a genetic algorithm takes is to generate a set of random blueprints which are used, one by one, to configure the device. After each reconfiguration, the device is tested to see how well (or otherwise) it carries out the desired task. The highest-scoring designs are retained as guidelines ("parents") for a new generation of designs. These "offspring" designs are created by swapping portions of the parents' blueprints with one another, or by making some random changes. This marginally improved population of designs then undergoes further testing, and the cycle then repeats itself until the device achieves an optimal level of performance.

The target could be determined right at the beginning of the device's operation or it could be adjusted continually. Either way, the device alters its structure to perform the task at hand in the best way possible. In the case of the Swiss Army knife, it would work out what shape to morph into on its own and leave its "processor" (the user's brain) free to address other matters.

Today, it is possible to contain the entire genetic algorithm—blueprint creation, fitness evaluation and reconfiguration—within a single microchip, and to run thousands of evolutionary trials in a fraction of a second. Although they were invented some 30 years ago, genetic algorithms have hitherto been run generally in software, where they placed a large and often prohibitive burden on the processor's time. EHW avoids this problem by running its genetic algorithms in hardware.

That is the crucial difference. In any digital device, wiring instructions into the actual hardware, rather than running them as part of the software, invariably boosts the speed of operation. In EHW, the speed advantage is so significant that the genetic algorithm for problems that could not have been solved in software can be cracked in real time—ie, with the solutions being produced as fast as the problems are fed in. This speed and flexibility makes EHW ideal for handling situations that vary rapidly.

Designers, resign

The most notable application of EHW so far is in the design of analogue circuits. While digital devices have become ubiquitous, they still have to communicate with the real world—and the real world remains stubbornly analogue. The fact is that people do not talk, hear, see, touch and taste in the ones and zeros of digital computerspeak. Analogue circuits are needed to measure or produce the wave-like signals of light, sound or temperature. Other analogue circuits known as A-D and D-A converters are needed to translate these continuous wave-like signals to and from the discrete language used by digital devices. Analogue circuitry is thus an essential part of the sensors, receivers and display units that play such a vital role in the modern wireless world.

It is no surprise that, with so much emphasis on digital circuitry these days, the design of analogue devices is becoming a serious problem. First, coming up with an efficient analogue circuit has as much to do with instinct as with physics. John Koza of Stanford University in California claims that analogue-circuit design is the domain of engineers "off in a room wearing purple hats with gold stars." Second, engineers with the necessary skills are in short supply. Texas Instruments, for instance, needs to recruit 500 analogue engineers a year—more than the number that graduate from all the universities in America.

A third problem is that even when a good circuit architecture is conceived, a large proportion of the devices fabricated turn out to be defective. In order to make a complicated job manageable, designers of analogue devices tend to assume that the components used in their circuits work in a uniform and predictable manner.

In the real world, however, environmental factors such as temperature and humidity can cause the electrical properties of a micro-circuit's resistors and capacitors to vary by as much as 20%. Such discrepancies matter far less in digital circuits, which simply have to detect whether an electrical current is more or less on or off. But such variations in analogue circuits can render them unusable. For instance, a cellular telephone will not work properly if its analogue filter allows the transmission frequency to vary by more than 1%. Until now, designers of analogue chips have tried to circumvent the problem by using larger components whose physical properties are more easily measured and controlled. Unfortunately, that leads to bulkier circuits that gobble power.

Tetsuya Higuchi and his colleagues at the Electro-Technical Laboratory in Japan have solved the stability problem by using EHW to accommodate the natural variations that occur between the components. His team use genetic algorithms to tweak the irregular analogue circuit components until they conform to the design specification. By testing the performance of each chip, the algorithm evolves an architecture that

can adjust automatically for all the variations in its resistors and capacitors. The group has found that 95% of analogue chips can eventually be coaxed into acceptable performance. That is a higher yield than most digital chip plants achieve. Dr Higuchi expects the first cellular telephones exploiting evolutionary hardware to be on the market by next September. Output of such EHW chips will then be running at hundreds of thousands per month.

Machines that invent

But it is the work done by Dr Koza at Stanford that gives a real glimpse of the future. By running genetic algorithms on analogue circuits that have been simulated in a computer, Dr Koza's machines have already produced seven circuit designs that he calls "human-competitive" because they infringe on patents previously issued to human inventors. Currently, each circuit design costs around $10,000 to simulate, which means that it is still cheaper to do the job manually. But as Dr Koza points out, processing power is becoming less expensive all the time, while human designers are becoming scarcer to find and costlier to keep. Dr Koza is optimistic that, given time, a design for a wholly novel and commercially viable circuit will emerge from his "invention machine".

While Dr Koza's simulated circuits are recognisable variations on human inventions, Adrian Thompson of Sussex University in Britain has evolved a circuit that is literally incomprehensible. Four years ago, Dr Thompson performed a seminal "proof of principle" experiment which described the evolution in hardware of a simple analogue circuit that could discriminate between two different audio tones.

The type of chip that Dr Thompson selected to carry out the evolution was a field-programmable gate array (FPGA). Unlike an ordinary chip, an FPGA's architecture is not "hardwired". Instead of being fixed, a string of bits specifies the chip's design by telling it what linkages to forge between its various components (in this case, groups of transistors known as logic cells). By changing this bit string, the FPGA's circuitry can be altered on the fly. Thus, when a genetic algorithm runs on the chip, the effectiveness of each configuration can be measured directly on the circuit rather than in some costly simulation.

As it turned out, conducting the evolution in hardware produced some results that could not have emerged through mere simulation. After around 4,000 generations of bit strings, a unique circuit emerged. The surprising thing was that, while the new circuit relied directly on only a few of the FPGA's logic cells, it appeared somehow to take advantage of clusters of other cells nearby. These unconnected neighbouring cells could not be removed without damaging the circuit's performance. Further investigations revealed that these detached cells exerted some subtle electromagnetic influence on the wired-up part of the circuit, allowing it to perform its task efficiently.

Remarkably, the circuit had adapted itself in a way that allowed it to exploit the underlying physics of the FPGA's semiconductor material. And it had done this despite the fact that the human experimenters were completely unaware of the physical quirks in the semiconductor that the genetic algorithm was taking advantage of. Four years on, this bizarre circuit has still not been completely deciphered. What has become clear, however, is that EHW's ability to adapt automatically means that it can exploit the physics of materials in ways that researchers do not even consider, let alone understand.

Beyond the realm of analogue and digital electronics lie all manner of unconventional physical systems—including the microscopic world of nanotechnology and quantum dots—where there are no well-developed design rules. By testing layouts that would never occur to humans, EHW can capitalise on the physical properties of these unconventional materials—even when engineers cannot fully account for their behaviour.

It may seem ironic that the direction being taken with evolvable hardware speaks so eloquently of the ignorance of the human architect. But, then, the use of evolution in design is really an admission that researchers have not as yet found anything better. Over the next few years, evolutionary machines could show humans the way.

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MONITOR

Magic bullet for pain–killers

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Use of the "axonal transports" through the brain allows pain-killers to be delivered precisely to just the nerves that need them—resulting in far quicker and longer-lasting relief

PAIN medicine is usually imprecise. To neutralise pain in one particular area, a drug has to travel in the bloodstream throughout the body, weakening its specific effect and often leading to unpleasant side-effects. Thus, many doses that are sufficient to provide pain relief also pose some risk to the patient. The ideal analgesic would provide localised pain relief in small doses with minimal side-effects. Aaron Filler, a neurosurgeon at the University of California, Los Angeles, believes he has found one. The secret lies not in the painkiller itself, but in the method for delivering it direct to the nerves causing the pain.

The technique makes use of "axonal transport", a phenomenon first discovered in the late 1940s. A single neuron can be as long as three feet; axonal transport allows communication to take place within the neuron by moving molecules from one end of a nerve cell to the other. To date, neurologists have used axonal transport chiefly to map neural pathways—tagging a molecule and seeing where it ended up.

Dr Filler's innovation—patented by SynGenix (of which he is a co-founder) in Cambridge, Britain—is a molecule called an "axonal transport facilitator" (ATF) which allows pain-killing molecules to enter cells within a specific nerve. Hundreds of drug molecules are attached to a long-chain polymer which, in turn, is attached to the ATF. As this "train" moves from cell to cell, the drug molecules are absorbed by the nerve cells. Because the pain medicine is so specifically targeted, it can be delivered in doses of a thousandth to a ten-thousandth of those currently employed. With such tiny infusions, the risk of systemic side-effects decreases greatly. Moreover, the concentrated application seems to be longer-lasting. Tests in animals showed that one dose of axonally delivered pain medicine could last up to four days.

The potential uses of ATFs are not limited to pain relief. Dr Filler speculates that they could eventually be used to treat problems such as muscle spasms which do not respond well to pain medicines now in use. ATFs might also be used to deliver treatments for diseases of the central nervous system, such as multiple sclerosis and Lou Gehrig's disease. A nasal spray with an ATF could deliver medicine to certain areas of the brain via the olfactory tract. Dr Filler hopes to begin clinical trials within two years. He first plans to test an anti-seizure medication which is used to treat pain that opiates cannot treat but is prone to causing nausea and drowsiness. If he is right, patients could soon be alert and comfortable enough actually to enjoy the relief of pain.

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MONITOR

Making materials atom by atom

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No more trial-and-error alchemy, materials can now be created with any desired properties—one atom at a time

IN A modern-day hunt for the Philosopher's Stone, scientists are swapping the painstaking and messy processes of the laboratory bench for the neater, cleaner world of the virtual. Instead of experimenting with chemicals in a search for better materials, Gerbrand Ceder at Massachusetts Institute of Technology is using the laws of physics to calculate new ones.

Dr Ceder has rejected the arcane delights of rainbow-hued salts and Bunsen burners in favour of 20 computers purring away in parallel. Starting from the Schrödinger equation—a mathematical formula that predicts how systems of atoms behave—he uses the rules of quantum mechanics to compute the properties of a theoretical structure. Then he adds an atom here, removes one there, until he hits on a material with the properties manufacturers are demanding.

Normally, materials scientists use trial and error to carry out experiments *in vitro*, (ie, in glassware) combining educated guesswork and chemical skill to cook up a new compound. With luck, they stumble upon something exciting, but most of the time the conditions vary sufficiently in each experiment to condemn them to a tedious and often fruitless search. By contrast, the joy of designing materials *in virtuo* (ie, with software) is that every variable can be precisely controlled at the click of mouse. Hit the enter key, wait until the computer spews its results and, in a matter of minutes, the researcher knows whether the new structure is a waste of effort or not.

The technique is not as simple as it sounds. The Schrödinger equation, which describes the interactions of electrons around a central atomic nucleus, demands that every electron affects every other. This means the calculations quickly become too complicated for even a powerful computer to handle an arrangement involving more than a few atoms.

To the rescue comes "density functional theory", a 30-year-old concept (for which a Nobel prize was awarded) that allows the electrons in many-atom systems to be treated independently. Only recently, however, has the method become practical, thanks to vastly more powerful computers. It is now possible to compute the quantum-mechanical properties of atomic systems that are in effect infinite.

Dr Ceder has already used the method to design a metal oxide which gives batteries a longer life. In a paper soon to be published in the *Journal of Applied Physics*, he describes how he and his student, Eric Wu, are employing the technique to help with the design of receivers for mobile telephones.

Firms making third-generation mobile phones want their receivers to be highly frequency selective, so they can cope with their allotted frequency band without suffering from interference. To do this, they need materials that absorb microwaves in an extremely narrow range.

Unfortunately, no one is really sure what causes materials to absorb microwaves over too wide a frequency. It could be defects due to missing atoms, thermal vibrations of the crystal lattice, or even the boundaries between small, imperfectly formed crystals that make up the material. By creating a perfect crystal on a computer and then testing it, Dr Ceder and Mr Wu have deduced that thermal vibrations are not the problem. That is good news: defects in the crystal, unlike ambient temperature, can be fixed.

Surprisingly, few companies for whom materials science is their bread-and-butter have yet picked up on the techniques. Ford Motor Company is an exception. Recently, the firm set up its own computational materials group. One of Ford's challenges is to improve the fuel economy of its vehicles while meeting emissions regulations.

The problem is that metals, such as platinum, which are currently used in catalytic converters to remove

pollutants from exhaust fumes, become ineffective when the engine's air/fuel mixture is tuned for fuel economy. By calculating the catalytic properties of materials on a computer, the group is learning what it is that makes other materials, such as copper zeolites, more effective under these conditions. Designing the right catalyst is a key to building a less thirsty car. A virtue from *in virtuo*, indeed.

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Power to the telephone masses

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A protocol that allows voice, data, fax, video, instant messaging and even online gaming to be integrated with web-based applications

THINK of what the PC did to mainframe computing and the makers of “heavy iron”. That gives some idea of what the SIP phone could do to the traditional telephone system and the telcos that operate it. SIP is to VoIP (see article) what the PC was to the radical notion two decades ago of distributed processing—in short, the user-friendly gizmo that ushered in a wholly new way of doing things. So with SIP.

The Session Initiation Protocol (SIP) is emerging as the favoured standard for setting up, modifying and terminating telephone calls over the Internet. Its main attraction is that it puts all the power of the network—plus the ability to change things on the fly—in the hands of the user.

Want to set up instant telephone conferencing, voicegrams, follow-me, a global phone number, text-to-speech delivery or online statements? No more waiting months for the phone company to program such features (if actually available) into its local telephone exchange. With the click of a button or mouse, SIP phone users will be setting up all these things and more for themselves the instant they need them—and cancelling them, if they choose, the moment they have finished with them. Press a couple of keys and all phone calls to your daughter are blocked while she finishes her homework. Hit a couple more and the bar is removed and her accumulated voicemail played back.

Giving such control to the end-user is anathema to the telephone clergy. As befits an organisation that oversees a vertically integrated global network with control concentrated at the centre, the International Telecommunication Union would have all VoIP suppliers adopt a Byzantine standard called H.323. This is derived from an old video-conferencing protocol that specifies everything but the colour of the knobs and switches. There is no question that H.323 works, but it is needlessly complicated and understood only by the anointed few.

By comparison, SIP could not be simpler, being modelled on the Hypertext Transfer Protocol (HTTP) used for specifying web-pages. Unlike H.323, SIP does not try to specify anything it does not have to. Instead of using arcane codes drawn from telephone signalling, SIP defines how a call should be set up, modified and torn down afterwards in the form of simple text commands—something which thousands of web-programmers can do blindfold.

But the really clever thing about SIP is that it makes a complete distinction between establishing a communication session between two or more parties, on the one hand, and what that session actually is on the other. That means SIP’s controls for establishing, modifying or terminating a session can be applied equally to any kind of session—be it a telephone call, videoconference or multiplayer game of “Doom”. In short, SIP is much more than just a smart telephone. It allows voice, data, fax, video, instant messaging and even online gaming to be integrated with web-based applications. The possibilities for e-commerce are endless.

And because it has its origins in the web, phone numbers on a SIP-based network become effectively the same as e-mail addresses—ie, yourname@yourhost.com. A glimpse of this can already be seen in Japan. Subscribers to NTT Docomo’s popular i-mode service use their phone number as part of their e-mail address (ie, mobilenumber@docomo.ne.jp), allowing them to send and receive e-mail messages from their phones while chattering away. SIP is going to let users do even more—and free them, at the same time, from the slow and heavy hand of the telephone company’s central office.

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LAST WORD

Rethinking machines

Mar 22nd 2001
From The Economist print edition

Danny Hillis, a computing pioneer and the inventor of the 10,000-Year Clock, has a distinctive perspective on the relationship between humanity and technology

THERE are probably a few dozen people alive today who can claim to have designed a machine that, for a few weeks or months, was the fastest computer in the world. But Danny Hillis is unique among them in also being able to claim to have designed the slowest. For he is the man behind both the blindingly fast "Connection Machine" computers and the "10,000-Year Clock", a binary-mechanical computer that ticks twice a day and chimes once a century. To describe Mr Hillis as an inventor, or a computer scientist, hardly does justice to his unusually philosophical attitude towards technology. Perhaps the best way to describe him is as a "metatechnologist"—someone who thinks about machines that change the way people think about machines.

Applied Minds

Danny Hillis thinks about machines that change the way people think about machines

Mr Hillis first came to prominence in the 1980s as a pioneer of a computing technique called "massively parallel" processing, the subject of his thesis at the Massachusetts Institute of Technology. At the time, computer scientists were struggling with the problem of getting computers to go faster, not by increasing the speed of their processing units, but by using two or more processors in parallel. The difficulty comes in dividing up the work between the processors in an efficient manner. Most researchers in the field believed that there was a limit to the speed increases possible through parallel processing, because there would always be parts of a problem that could not be divided up. A few parallel-processing computers existed, typically with between two and eight processors. So Mr Hillis was, to say the least, going out on a limb when he proposed the construction of a computer with 65,536 processors connected in a 12-dimensional "hypercube".

At first his suggestion was not taken seriously, but Mr Hillis and others showed that such a machine was, in fact, feasible. This involved devising an efficient way for thousands of processors to communicate with each other, along with new programming tricks that allowed common problems to be divided up between multiple processors—and solved more quickly as a result. In 1983, Mr Hillis established a company, Thinking Machines, to commercialise his idea, and in 1985 it built its first product: the Connection Machine Model 1, or CM-1. An imposing black cube, measuring five feet on each side and adorned with thousands of flashing red lights, this showed that Mr Hillis's apparently hare-brained idea—"massive" parallelism—actually worked.

The Connection Machine, with its thousands of simple processors, was explicitly modelled on the human brain, which consists of 100 billion or so very simple neurons. It was in marked contrast to other supercomputers, such as those built by Cray, the market leader, which had one or two extremely complex and powerful processors. Mr Hillis hoped his design would be better suited to those tasks, such as facial recognition, that humans find easy and computers find hard. But it turned out that the "killer app" for the Connection Machine was not artificial intelligence, but scientific modelling. Richard Feynman, a Nobel-prize winning physicist, worked at Thinking Machines in its early days and realised that massively parallel machines were ideal for modelling processes in areas such as fluid dynamics, particle physics and astronomy. This insight led to the CM-2, which had an extra 2,048 processors to handle floating-point arithmetic and could thus do complex scientific calculations better.

Thinking Machines' customers included the Los Alamos National Laboratory, American Express and America's space agency, NASA. The hardware design was refined with the CM-5, and Mr Hillis even drew up plans for a Connection Machine with a mind-boggling 1m processors. His company also pioneered the idea of redundant disk storage arrays, in which a large number of hard disks

"Engineered systems are brittle, frail and liable to fail in

unexpected ways."

are combined to form a huge storage system. But as the idea of massive parallelism took hold, the practice of building supercomputers by combining a large number of standard microprocessors became commonplace. Mr Hillis left Thinking Machines in 1994; the firm's hardware business was eventually bought by Sun Microsystems, and its software business, which specialised in data analysis, was acquired by Oracle. In a sense, by showing that massive parallelism was feasible, the company helped to put itself out of business. As if to prove Mr Hillis's point, IBM is now building a massively parallel supercomputer, Blue Gene, which will combine over 1m processors to form the most powerful computer ever built.

Long Now Foundation

The experience of working with scientists in a diverse range of specialised fields had a strong impact on Mr Hillis. He saw that the trend towards increasing specialisation meant that researchers in different fields were often unaware of what others were doing. Or, as he characteristically puts it, "all of this getting smarter is making us dumber." And trying to stay ahead of the fast-changing computer industry, he found, resulted in a very short-term perspective on the future. Mr Hillis started to think about a deliberately long-term project he could work on—something that, like a medieval cathedral, would not be completed within the lifetime of anyone present at its start. Prompted by the pre-millennial euphoria of the 1990s, Mr Hillis had the idea of a clock that would run for 10,000 years.

Most of the people he mentioned it to thought it sounded crazy. His friends and colleagues wondered why such an obviously talented engineer should waste his time on such an apparently whimsical project. But Mr Hillis's idea struck a chord with some people. It made engineers start to think about how such a clock could be constructed; lawyers and financiers began to wonder how to establish an institution that could survive for such a long time (a religion, perhaps?); meteorologists tried to imagine the weather 10,000 years hence, far beyond even the centuries-long forecasts of global warming. In short, the idea of the clock made tangible the concept of the far future, of "deep time", and thus offered an antidote to technological short-termism.

As with the Connection Machine, Mr Hillis is really interested in the idea behind the clock, rather than the actual hardware. But, as with his massively parallel computers, he knew his clock idea would only be taken seriously if he actually built it. So, encouraged by a handful of like-minded friends, he set to work. He decided that the clock's design had to conform to a set of general principles: longevity, transparency, maintainability and scalability. Longevity goes without saying; transparency means workings that can be understood by inspection; maintainability means using nothing that would be beyond a bronze-age culture; scalability means a design that can work on scales from the table-top to the monumental. Longevity precludes the use of gears, which can wear, while maintainability and transparency rule out the use of electronics or atomic power. Tidal and geothermal power might work for a very large clock, but not for a small one.

Eventually Mr Hillis opted for a design that is both mechanical and, appropriately given his background, digital. Called the "bit serial mechanical adder", it uses sets of 28 movable levers, each of which can be in one of two positions, to store 28-digit binary numbers. Each set of levers is called an accumulator; the "year" accumulator stores the fraction of a year that has elapsed. Twice a day, when the clock "ticks", an ingenious mechanism adds a fixed value to each accumulator. After a year has passed, the value stored in the year accumulator overflows, the clock's display of concentric rotating rings is updated, and the left-over fraction is stored, so there are no rounding errors.

The first prototype of the clock, eight feet tall, was completed in 1999 and is now ticking in the Science Museum in London. Mr Hillis has since started work on a second, larger prototype. And last year the Long Now Foundation, a non-profit organisation established to promote projects with a 10,000-year perspective and funded by Silicon Valley millionaires, bought a mountain in Nevada where the full-scale clock will be installed. The mountain has a good deep-time pedigree, since it is home to some of the oldest living things on earth: 5,000-year-old bristlecone pine trees. Meanwhile, the foundation is working on other projects, including the Rosetta Disc, which will use semiconductor etching techniques to etch the same text in 1,000 languages on to a three-inch metal disc. The idea is to manufacture many such discs and sprinkle them around the world, to assist archaeologists of the far future in deciphering lost languages.

The human touch

The common theme in all of Mr Hillis's activities is the relationship between humans and machines. The brain-like Connection Machine is an example of technology informed by humanity; the 10,000-Year Clock and the Rosetta Disc use technology to encourage the contemplation of humanity's far future. Between 1997 and 2000, Mr Hillis pursued these ideas alongside his day job as a research fellow at Walt Disney Imagineering, where his brief was essentially to have interesting ideas. He has recently parted company with Disney and is now setting up a new firm, called Applied Minds, in conjunction with Bran Ferren, his former boss at Disney, and Doug Carlston, the co-founder of Broderbund, an educational software firm. Mr Hillis is secretive about his new firm's activities, other than to hint that they may involve acting as an "idea factory" developing ideas for subsequent licensing to others, and might relate to educational computing. "We are educating people today in the same way as we did when there was 1% as much knowledge," he points out. Industrialisation extended humans' physical capabilities, he suggests, but computers have yet to extend their intellectual capabilities.

Evidently the new idea factory will not be short of raw material. But among Mr Hillis's many theories and speculations, perhaps the most provocative concerns the limits of engineering. He suggests that as technology becomes more complex, from operating systems to airliners, the pitfalls of engineering are becoming apparent. Engineered systems are brittle, frail, and liable to fail in unexpected ways; Mr Hillis says he is surprised that the engineering approach still works. Some day, he speculates, complex systems, from artificial minds to spacecraft, may be constructed using self-organising components that are guided in ways like gardening. In which case all bets about future technology, which tend to be based on extrapolations of engineering, will be off. It sounds crazy. But, not so long ago, so did the idea of a computer with 1m processors.

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MONITOR

Smart tyres

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Reuters

The new drive-by-wire components are making cars much safer, but putting heavy demands on their electrics

ALTHOUGH it may not look like it, the driver blocking the traffic in that huge four-wheel-drive vehicle ahead of you contains more processing power than was used by the *Apollo* spacecraft. Anything from 10% to 20% of the cost of the average car goes to pay for its electronic equipment. In luxury models, the percentage is double that. The rest of a modern car, though, is still a mixture of hydraulics and mechanical parts that have barely changed in 50 years. But during the next few years, car makers the world over will replace more and more of these relics from the past with new kinds of electronic sensors, microprocessors and actuators. The result should be vehicles that are inherently safer and more responsive, and also capable of acting intelligently in dangerous situations.

The tyre is one component of the modern car that has, until now, stubbornly resisted infiltration by electronics. Because tyres have to withstand a great deal of mechanical stress and heat, they are generally a bad place to leave delicate bits of technology. But Franz Dollinger of Siemens, a German engineering and electronics firm, has avoided this problem by splitting his new tyre-monitoring system into two parts. One, embedded in a sturdy package, senses what is going on in the tyre, while the other collects and interprets those data from somewhere safe within the car's body.

To pick up information about the stress being felt by a tyre, Dr Dollinger has used a piezoelectric device that is rather like an old-fashioned gramophone stylus. Piezoelectric materials, such as quartz and lithium niobate, are crystals that respond to changes in their shape by producing a minute electrical current. Conversely, they can respond to electric signals by subtly changing their shape. When such crystals are embedded into a tyre tread, they deform in response to the tyre's pressure and its grip on the road.

With the help of a radar-like probe located in the body of the car, these deformations can be detected and interpreted. The probe sends out a radio wave that is picked up by a metal antenna or "transducer" attached to the piezoelectric crystal. This signal causes the surface of the crystal to undulate. That surface wave, in turn, produces another electric signal, which is emitted via the transducer. By picking up this return signal, the radar probe's own antenna collects information about the crystal and, thus, the physical state of the tyre.

By registering the amount of friction between the tyre and the road, the system warns the car's computer-control equipment if the car is in danger of aquaplaning on a large puddle or skidding on ice. The computer-control system can then apply the brake on the wheel concerned, and even adjust the amount of engine torque sent to that wheel, so that skidding is prevented. Continental, a German tyre company, expects to have tyres equipped with the piezoelectric safety system on the road within a few years.

Eventually, the goal of motor engineers is to produce a car that will sense and respond to obstacles the

way that Dr Dollinger's tyres sense and respond to slippage. Some luxury cars already contain adaptive cruise control, which uses radar or laser-based sensors to track the movements of vehicles on the road ahead. The vehicle can then adjust its speed so that it maintains a constant and respectful distance from the car in front. Over the next couple of years, such sensors will expand their range, to check for obstacles entering a car's blind spots and issue warnings to drivers if a collision seems imminent.

Such improvements are helping to make cars much safer, but the driver still has to do the actual steering. That will change in the near future. Car companies in Europe, America and Japan are working hard to perfect "steer-by-wire" technology so that a car's collision-avoidance radar can lend a hand in guiding the vehicle.

Delphi Automotive Systems of Troy, Michigan, has created a system called E-Steer which eliminates the need for the traditional power-steering system's hydraulic pump, hoses, fluid and belts. A sensor detects the inputs to the steering wheel that the driver makes in order to guide the vehicle, and then directs an electric motor to do the donkey work instead. This makes the vehicle lighter and potentially easier to handle, and possibly more fuel-efficient as well. Delphi will start equipping one American car model with E-Steer by 2003.

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MONITOR

Son of paperclip

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Mobile Manager has an almost telepathic ability to distinguish junk mail from genuinely important messages

ERIC HORVITZ, a researcher at Microsoft and a guru in the field of Bayesian statistics, feels bad about the paperclip—but he hopes his latest creation will make up for it. The paperclip in question, as even casual users of Microsoft's Office software will be aware, is a cheery character who pops up on the screen to offer advice on writing a letter or formatting a spreadsheet. That was the idea, anyway. But many people regard the paperclip as annoyingly over-enthusiastic, since it appears without warning and gets in the way.

To be fair, that is not Dr Horvitz's fault. Originally, he programmed the paperclip to use Bayesian decision-making techniques both to determine when to pop up, and to decide what advice to offer. (Bayesian statistics are named after Thomas Bayes, an 18th-century Presbyterian minister who devised a mathematical rule for explaining how you should change your existing beliefs in the light of new evidence.)

The paperclip's problem is that the algorithm (sequence of programming steps) that determined when it should appear was deemed too cautious. To make the feature more prominent, a cruder non-Bayesian algorithm was substituted in the final product, so the paperclip would pop up more often.

Ever since, Dr Horvitz has wondered whether he should have fought harder to keep the original algorithm. The impressive abilities of his latest creation, an e-mail filtering system called Mobile Manager, suggest that he should have. In essence, Mobile Manager evaluates incoming e-mails on a user's PC and decides which are important enough to forward to a pager, mobile phone or other e-mail address. Its Bayesian innards give it an almost telepathic ability to distinguish junk mail from genuinely important messages.

Mobile Manager grew out of a two-year-old research system called Priorities, a more powerful filtering system that Dr Horvitz developed for his own use and is now widely employed internally at Microsoft (a practice known as "eating your own dogfood"). Priorities takes a vast amount of information into account when evaluating the importance of an incoming message. For a start, it looks at the message itself to see if it contains urgent language (such as "tomorrow" or "as soon as possible"), direct questions, the recipient's name, and statements in the future (as opposed to the past) tense. It checks to see if the sender is in the recipient's address book, whether the message has been "carbon copied" to many users, whether the message is short or long, and what the message's internal structure is. It then combines these and other clues using Bayesian decision theory to evaluate the "cost of delayed review per hour"—in other words, the message's importance.

But the cleverness does not end there. Over time, Priorities learns what a particular user regards as important or unimportant. Messages that are deleted without being opened are taken as examples of unimportant messages. Messages that the user replies to immediately are regarded as important. The software can also be trained explicitly by sorting a handful of messages into "important" and "unimportant" categories.

The result is a constantly updated list of incoming e-mails ranked by urgency. But Priorities also decides what to do with each message, by taking into account the context of its arrival. It can look at the user's calendar to see whether a meeting is going on, or whether he is on holiday. It can use a camera to determine if the user is sitting in front of a PC and whether he is looking at the screen. It can analyse ambient sound to determine whether he is having a conversation, and hence whether the user is busy or not. These factors are employed to decide whether to sound a chime, display a visual alert or, if the user has been away from the PC for more than a few minutes, to send a message to a pager or other device.

The software also allows the user to specify how important messages have to be to trigger mobile alerts. A message's importance, however, is not fixed. A message that is important on a quiet Thursday morning may not be so vital as to interrupt Sunday lunch or a vital meeting. Alerts can also be delivered in batches at specified intervals, or when a certain number of important messages have accumulated.

Mobile Manager, which offers a subset of Priorities' features as an add-on for Microsoft Outlook, was released on the company's website in February. Priorities' more Big Brother-ish features, such as watching and listening to users, are not included. But the Bayesian decision-making system is. Thanks to the paperclip, this technology got an undeservedly bad name for intrusiveness. This time around, the same technology is intended to do the opposite, and bother people less. It is a fitting antidote to the pesky paperclip.

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MONITOR

Talking heads

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Technology companies are bringing a new face to the web—and it could be yours

THE resemblance is uncanny. Emma looks like the girl next door. She talks like the girl next door. She welcomes you into her shop, asks about your children, wonders how you liked the apricot preserves she recommended and reminds you that Gerber baby food is on sale this week. But unlike the girl next door, Emma is 100% virtual—a member of the artificial intelligentsia. Many businesses are banking on the hope that she will be the saviour of online customer service.

Stratumsoft

The idea is that realistic, three-dimensional "bots" will help make the online experience of tomorrow far closer to real life. While some companies are creating databases that recognise speech and can answer questions in full sentences, others are working on realistic, 3D characters to put in front of these databases. With faces created from real photographs, and personalities based on psychological questionnaires answered by real people, the result is intended to make the Internet a friendlier place.

Ultimately, what most online retailers (or "e-tailers") want is to create personalised websites for their customers. The more they can tailor a site to a particular consumer's needs, the more likely that consumer is to come back again and again. After all, one of the largest problems e-tailers face is customer dissatisfaction, which leads to a high rate of "shopping cart abandonment". Thwarted by search engines that frustrate or dissuaded by text-based, impersonal online shopping, many people give up on web-shopping and instead buy in person, where they can handle the merchandise and ask questions of the shopkeeper.

One potential remedy is to create a face-to-virtual-face interaction with a helpful, friendly looking, online sales assistant in the hope that, seeing a human-like figure who responds in a human manner, the customer will forge a relationship with the online business. Two companies currently in the process of developing such characters are Stratumsoft and LifeFX. Although they are using different technologies, both firms can create a lifelike, animated, talking head using only two photographs of a person. Stratumsoft of Richmond, Surrey, can take it a step further by hooking up its talking heads to a "smart" database that can understand and answer questions posed in natural speech. LifeFX of Newton, Massachusetts, has joined forces with another company, Kiwilogic of Hamburg, Germany, which will provide their virtual people with a knowledge base from which to do the same kind of thing as Stratumsoft does.

The benefits do not stop at customer loyalty. A bot such as Emma—one of Stratumsoft's ideas—takes the personalisation up a notch. Not only can she remember information about everyone who visits the site, but she can procure valuable marketing data by asking people about products they have bought in the past. In addition, bots can be programmed to suggest products to accompany those that a customer has already picked out. Emma, for example, might ask something like: "Shall I get you some cream to go with your strawberry pie?"

Another step in the personalisation process is a creation that LifeFX has dubbed Facemail. This allows people to write an e-mail with emotion. As the author writes the message, he can include "emoticons" such as ;-) or :-). When the recipient downloads the e-mail, a human-looking face reads the letter aloud, winking or smiling in the appropriate places. Within a year, the company reckons that Facemail users will be able to create their own "stand-in"—with the user's own face and voice—using data extracted from photographs and voice recordings.

Both Stratumsoft and LifeFX talk of the technology's long-distance communication potential. "Distance learning", conference calls and news broadcasts from foreign correspondents could all be lip-synched to

lifelike, animated, three-dimensional heads. Stratumsoft is also working with a popular musician to create a virtual twin who can live on forever in cyberspace. Based on the musician's answers in a personality profile, this twin will be able to respond to a fan's queries—from favourite colour to song inspiration. Whether that is a long way off or not, the creators have certainly stumbled on one of the web's key missing ingredients—warmth. And at long last they are beginning to put the face back into the interface.

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REPORT: ENERGY

The fuel cell's bumpy ride

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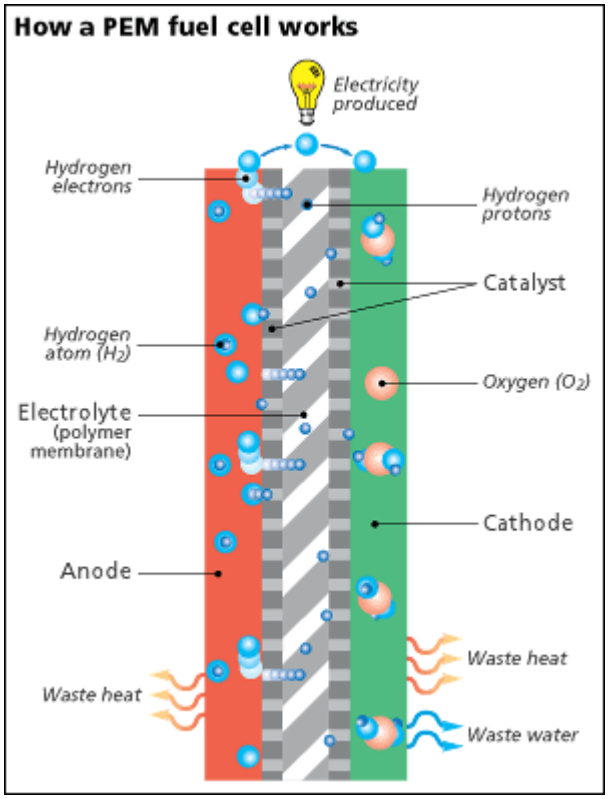
Motor manufacturers are betting heavily on fuel cells as the engines for tomorrow's cleaner cars. But how to make and store the hydrogen fuel?

THE thundering tom-toms just might be a sign of big changes ahead. Not long ago, dozens of people from around the world descended upon an idyllic country retreat in Canada for a most energetic pow-wow. The motley crew sat in a giant circle with native drums of every imaginable size and shape, and banged away till green inspiration struck. They then strategised about how to move the energy world beyond the filthy but durable workhorses of today—fossil fuels and internal combustion engines. They agreed that the future belongs to fuel cells, which produce clean energy by combining hydrogen with oxygen without combustion.

Now, here is the weird part: those peculiar percussionists were not wild-eyed greens, but sober technical experts from the world's biggest car companies, energy firms and research laboratories. Indeed, the whole shindig was organised by the new hydrogen division of BP, an oil giant. The reason for their enthusiasm was that, more than 150 years after its invention, the fuel cell is finally about to become a commercial reality.

HFCLetter

Green but no slowcoach: a Cobra with hydrogen in the tank will attempt to break the 108mph landspeed record for fuelcell cars this summer



In simple terms, fuel cells combine hydrogen and oxygen to produce electricity, while avoiding combustion and emissions any nastier than water and heat. Although there are variations on the theme, the most promising type of fuel cell is the "proton-exchange membrane". This is a sandwich of two electrodes—an anode and a cathode—with a polymer membrane serving as an electrolyte stuck in the middle (see illustration, or click for an animated version). At the anode, hydrogen gives up its electron with encouragement from the platinum catalyst. While the hydrogen ions (protons) slip through the membrane, the electrons are forced to travel around an external circuit, producing a current that can

power a car or a computer. When the protons reach the cathode, they join with the electrons and combine with oxygen from the air to create water and heat. The result is clean energy with no harmful emissions.

Already, it is clear that the electricity industry will be turned on its head by fuel-cell "micropower" units that are about to come on the market. Given the inadequacies of today's battery technology for such things as laptops and mobile phones, it seems likely that tiny fuel cells will transform the market for portable power, too.

But some think that fuel cells might even reach hydrogen's promised land: to become the power source of choice for transport. Nearly all of the world's leading motor manufacturers are trying to develop fuel-cell cars. Goaded on by government threats of "zero emission vehicle" mandates in California and curbs on carbon emissions in Europe, they are pouring billions of dollars into fuel-cell research. They vow to have fuel-cell cars on the market by 2004.

So the hydrogen revolution is about to transform ground transport? Do not hold your breath. In fact, fuel cells might yet prove to be a costly and humiliating flop in cars, even as they take off in other applications. The reason is that the world is just not set up to deliver hydrogen on demand.

In tackling that slightly awkward problem, fuel-cell fans fall into two camps. One camp thinks that hydrogen infrastructure will be far too costly to build for decades to come, and so wants to use some interim fuel during the transition. Such voices point to studies suggesting that building a hydrogen infrastructure could cost $100 billion or more in America alone. The other camp reckons that the investment needed will be much less, and insists that going direct to hydrogen is the only sensible option. Who is right, never mind who will win, is unclear.

The reform club

Everybody agrees that the greenest and most elegant way to feed fuel cells is using hydrogen fuel directly. Indeed, some day in the future, the hydrogen may even be derived from renewables. Until that Utopia arrives, many firms plan to use interim fuels such as methanol or petrol and extract hydrogen on board the vehicle using a "reformer". Such cars would not be emission-free, but would still be much cleaner than today's vehicles.

The methanol champions argue that, unlike petrol, their fuel can be produced from a variety of sources ranging from natural gas to "biomass" (ie, plant matter, cow dung and such like). This may make methanol attractive in poor countries, which use a lot of biomass. Rich countries may prefer methanol because it would reduce their dependence on OPEC.

Advocates note that there are big plants today producing methanol; indeed, there is a global glut. They suggest that this is enough to feed early fuel-cell cars, and so help to achieve mass-market economies of scale—at which time hydrogen can make a graceful entry. Maybe. The danger is that as methanol fuel cells take off, output will have to be increased and retail distribution expanded, leading eventually to stranded assets. Sceptics argue that it might be cheaper to go straight to hydrogen.

Even so, DaimlerChrysler gushes about its "direct methanol" fuel cell, which needs no reformer at all. It recently demonstrated a 3 kilowatt version which powered a go-kart. If perfected, this would be a genuine breakthrough. However, huge technical hurdles remain and commercialisation looks a decade or two away.

The best argument for methanol reformation is that it clearly works, while petrol reformation remains in doubt. That is chiefly because petrol—a far more complex fuel than methanol—contains carbon-carbon molecular bonds that take a lot of energy to break. Petrol reformers must operate at high temperatures (ie, 800°-900°C), while methanol reformers run at perhaps a third of that temperature. The methanol backers gloat that they have more or less solved the chief technical puzzles: Daimler's new NECAR5 boasts a reformer that powers a 50 kilowatt fuel-cell stack, while petrol reformation remains stuck in the laboratory.

"Car makers are pouring billions into fuel–cell research and vow to have fuel–cell cars on the market by 2004."

But the petrol researchers insist they have made great progress in recent months. Bill Innes of Exxon Mobil claims that his firm's fuel-cell alliance with General Motors and Toyota, which has been spending

$100m a year on research, has made a breakthrough with its laboratory reformer. He is hoping to install it in a fuel-cell vehicle by the end of this year.

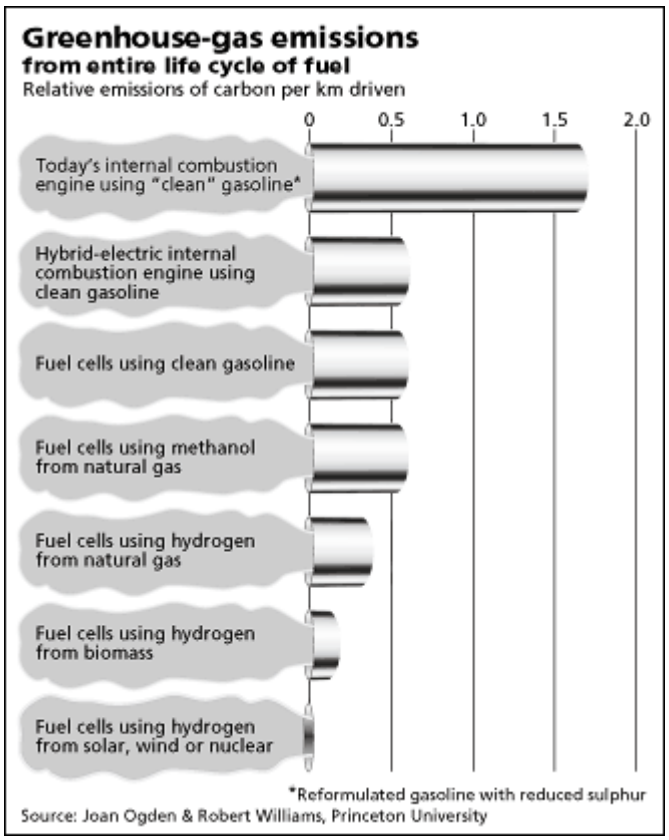
However, even if his team can get the size and cost to reasonable levels, it will be difficult to ensure that the fuel-cell has a snappy response. That is because the complicated workings of a petrol reformer tend to slow the response of the fuel cell to an intolerable level. Exxon Mobil claims that its equipment solves this problem by controlling the fuel composition precisely. But that is a task that today can barely be done on the laboratory bench. Whether and when this can be done on the open road is unclear.

If petrol reformation takes off, methanol will lose out. After all, petrol is ubiquitous and familiar and the world is set up to deal with it on a massive scale. However, there is a wild card that could still cause petrol reformation to fail in the market, argues Robert Williams of Princeton University. That is the recent arrival of highly efficient hybrid cars such as the Toyota Prius and Honda Insight that combine petrol engines with electric motors. He argues that as long as the main competition for the petrol fuel-cell car was the conventional internal combustion engine car, the economic case made some sense. The higher initial cost (an extra $5,000, including the reformer) could be more than offset by the likely doubling of the fuel efficiency plus the environmental benefits. However, these new hybrids achieve levels of fuel efficiency and emissions comparable to those of petrol fuel-cell cars today—but at a much lower cost, even when the manufacturers' hidden subsidies are discounted. It is quite possible that petrol fuel-cell cars could lose out to hybrids and thus fail to capture the market share needed to succeed.

Encouraged by the clouds hanging over reformers, some argue for a move direct to hydrogen. Before contemplating the economics, however, enthusiasts for such an approach must first surmount three hurdles that opponents claim are insurmountable: safety, storage and supply. The easiest to tackle is safety. Hydrogen is often perceived as dangerous, but that reputation is largely undeserved. It is true that hydrogen is inflammable. But methanol is corrosive and extremely toxic, and petrol is both a carcinogen and easily ignited. A related factor is that hydrogen is a gas at room temperature and disperses rapidly, unlike methanol and petrol. With public education and garage-style handling, hydrogen can be at least as safe as today's fuels.

Unbearable lightness

A tougher challenge is storage. The problem is that hydrogen has the smallest atomic structure of all elements. That causes two problems when trying to handle it. One is that, being so tiny, hydrogen atoms can wiggle through the crystal lattice of the material used to contain it. The leakage from a pressurised hydrogen tank could be significant. The second problem is a consequence of the fact that, being so small, hydrogen is also exceptionally light. In a typical gaseous storage system, it has only a tenth of the volumetric energy density of petrol.



The obvious answer is to compress the hydrogen. Impco, the leader in this field, has devised an ingenious all-composite tank that can hold enough hydrogen at a pressure of 5,000 pounds per square inch (psi) to travel 300 miles. The tank meets stringent safety standards and is expected to cost only about $1,000. Holding more than 40 gallons of hydrogen, it is still far bulkier than the average petrol tank. But the firm is testing a tank capable of storing hydrogen at 10,000psi, which should be much more compact.

The best way to store hydrogen, however, may well be in some solid form. That would offer advantages of safety as well as convenience. Some experts point to the promise of so-called carbon nanotubes—a form of carbon that experiments suggest could reversibly store astounding quantities of hydrogen. But that is fantasy for the time being. A more tangible approach involves metal hydrides, which store and release hydrogen in the way that the batteries in some of today's mobile phones and laptop computers do. The firm that pioneered the rechargeable nickel-metal hydride battery, Energy Conversion Devices (ECD) of Troy, Michigan, claims to have repeated the same trick with fuel cells.

Though rivals are sceptical, ECD's Alastair Livesey says tests prove that its new metal hydride can be recharged in just a few minutes; will last for over 500,000 miles; and can travel 300 miles without refuelling. The tank will weigh about 220 pounds—twice the weight of a full petrol tank—but be only slightly larger, and drivers could fill it up with hydrogen at filling stations. The firm and its oil industry partner, Texaco, believe they can get this project from the research phase to the mass market within five years.

But what about supply? In itself, hydrogen is just a fuel, not an energy source. Hydrogen is the most abundant element in the universe, but rarely exists in its free state on earth—being found normally in combination with oxygen (as water) or carbon (as methane and other hydrocarbons). As a result, it always takes energy to free it for use, whichever way it is produced.

One approach is to strip hydrogen out of hydrocarbons. Firms already do this today by reforming natural gas at centralised plants. The hydrogen produced in this way is used to make ammonia fertilisers and to "lighten" heavy grades of crude oil. The earth's vast reserves of coal could also be tapped. The production costs of hydrogen from such centralised approaches could be competitive with that of petrol, but the snag is that an expensive system of pipelines or tankers would still be needed to get that hydrogen to consumers.

Another approach is electrolysis, which zaps hydrogen free from water using electricity. This process is energy intensive, so large-scale electrolysis is likely to take off first in places with cheap, clean sources of hydro-electricity. However, it does benefit from the fact that its two prerequisites, electricity and water,

are fairly well distributed around the world.

Crunching the numbers

Even if safety, storage and supply are sorted out, does a direct shift to hydrogen make economic sense? It might, provided three big “ifs” are fulfilled—if the hydrogen is phased in over time, if governments give hydrogen strong regulatory support, and if manufacturers produce hydrogen cars that consumers actually want to buy.

To reduce the cost of manufacturing fuel cells and win public acceptance, central and local authorities will have to encourage a shift to hydrogen for fleet vehicles such as city buses, delivery trucks and so on. Since such vehicles are roomy, compressed hydrogen tanks will not be much of a penalty. Fleets of commercial vehicles have the added advantage of refuelling at central depots. So, setting up the infrastructure for refuelling them will be less of a problem. Already, hydrogen buses have been roaming the streets of Vancouver and Chicago. The World Bank believes such vehicles could play a role in helping to reduce urban smog in poorer parts of the world.

Phasing in hydrogen infrastructure is thus the first part of the puzzle. The oft-cited estimates of $100 billion or more for that are outlandish. That is because duplicating today’s petrol infrastructure, from day one, is simply not necessary. Experience with the introduction of diesel in America and unleaded petrol in Germany shows that even if only 15% of forecourts offer it, a new fuel can become widely accepted.

Directed Technologies, a consultancy based in Arlington, Virginia, argues that hydrogen can be produced in a distributed way economically. One option is to tap into the existing natural-gas grid to reform hydrogen. Firms such as International Fuel Cells of South Windsor, Connecticut, are now developing small reformers to do precisely that. These can be placed at petrol stations, supermarkets or even office blocks. Stuart Energy, a firm based in Toronto, is building tiny electrolysers for a car that can produce hydrogen from off-peak electricity. It aims to sell these for $2,000. Electrolysis is especially suited to the early years of hydrogen-powered cars because it is inherently scalable. Hydrogen electrolysis units make economic sense with only 25-50 cars sharing them. By contrast, the smallest hydrogen reformers need 300 users or so to be cost-effective.

Thus the economics of a hydrogen roll-out are not complete nonsense. Even so, explicit government supportmay still be needed. A new study by Dr Williams and Joan Ogden and Eric Larson, two colleagues at Princeton, suggests that, after the initial introduction, direct hydrogen fuel-cell cars will offer significantly lower costs and greater benefits to their users, as well as to society as a whole, than rival fuel-cell options. Unfortunately, the initial hurdle is so high that market forces alone may not spur the necessary investments. Dr Williams thinks the direct-to-hydrogen route will fail unless governments embrace zero-emission mandates like the Californian initiative. But if they do that, the Princeton group expects hydrogen fuel-cell cars to be successful. Within 20 years, they argue, the world could then enjoy extremely low vehicle emissions—and consumers would pay no more than they do today for transport.

That points to the most crucial factor of all in deciding the fate of fuel cells in transport—the actual consumer benefits. The clearest advantage fuel cells offer over the internal combustion engine is the potential for very low or zero emissions. But that may not be important to consumers. A more meaningful benefit is likely to be the fuel cell’s superior efficiency. Today’s internal combustion engines are notoriously inefficient, converting only about 15% of the heat content of petrol into useful energy. Even in their primitive state, fuel cells can already manage at least twice that efficiency. As fuel-cell technology matures, a rising level of efficiency will mean falling operating costs.

The switch to fuel-cell cars promises other differences that consumers may find attractive—a much quieter ride, a constant torque regardless of speed, a clean “engine off” energy source for power-guzzling electronics and a simpler transmission system requiring less maintenance. And, maybe, the fuel-cell car could even be a source of revenue for home-owners. Plugging it into the home electricity supply and transmitting the power generated by the car back to the grid while it sits in the garage could earn a profit on the energy market.

Contrary to conventional wisdom, going direct to hydrogen is not necessarily a folly. However, it is still possible that firms betting on such a technically superior option may get trumped in the marketplace by rivals peddling an inferior but more accessible technology—be that fuel cells with reformers in the tank or petrol-engined hybrids. Don Huberts, boss of Royal Dutch/Shell’s hydrogen division, says: “That is why everyone is placing bets on several horses. By no means is it clear today which the winner will be.” The

race is on and whichever type of fuel-cell car is the eventual winner, the world will be a cleaner place.

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Economist.com PRINT EDITION TECHNOLOGY QUARTERLY

The online doctor is in

Mar 22nd 2001
From The Economist print edition

Though still in its infancy, telemedicine is already doing some grown up tasks

WANT a glimpse of the future of health care? Take a look at the way the various networks of people involved in patient care are being connected to one another, and how this new connectivity is being exploited to deliver medicine to the patient—no matter where he or she may be.

Online doctors dishing up advice based on standardised symptoms are the most obvious example. Increasingly, however, remote diagnosis (telemedicine) will be based on real physiological data from the actual patient. A group from the University of Kentucky has shown that by using an off-the-shelf PDA (personal data assistant) such as a Palm Pilot plus a mobile phone, it is perfectly feasible to transmit a patient's vital signs over the telephone. With this kind of equipment in a first-aid kit, the cry asking whether there was a doctor in the house could well be a thing of the past.

Other medical technology groups are working on applying telemedicine to rural care. And at least one team wants to use telemedicine as a tool for disaster response—especially after earthquakes. Overall, the trend is towards providing global access to medical data and expertise.

But there is one caveat. Bandwidth is the limiting factor for transmitting complex medical images around the world—CT scans being one of the biggest bandwidth hogs. Communications satellites may be able to cope with the short-term needs during disasters such as earthquakes, typhoons, wars or famines. But medicine is looking squarely towards both the second-generation Internet and third-generation mobile phones for the future of distributed medical intelligence.

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MONITOR

The power industry's quest for the high nines

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From The Economist print edition

Innovations are improving the quality of electrical power, so computer networks can run for not just 99.9% of the time, but for the 99.9999% that e-commerce demands

AP

FOR THE average computer or network, the only thing worse than the electricity going out completely is the power going out for a second. Every year, millions of dollars are lost to seemingly insignificant power faults that cause assembly lines to freeze, computers to crash and networks to collapse. The Electric Power Research Institute, an industry research and standards group based in Palo Alto, California, estimates that 80% of the power glitches that wreak havoc on an electronic system last for less than a few seconds—barely noticeable to the eye. In light of events such as the California power debacle, many expect the rate of those disturbances to rise, as deregulation and distributed generation place ever more stress on America's ageing power grid.

That expectation has fuelled a boom in "power-cleaning" technology, driven by innovations that promise to deliver near-faultless power to the digital economy. Some of the developments that are nearing adoption include power-chips that can switch from the electrical grid to alternate power sources in milliseconds; flywheels and super-capacitors that allow equipment to ride through a power hiccup; and silicon power plants capable of delivering megawatts of extremely "clean" electrical power. The result, says Mark Mills of the *Huber-Mills Digital Power Report*, will be a $500 billion industry rising from America's tangled power lines.

For more than a century, the reliability of the electricity grid has rested at 99.9%—"three nines" in industry jargon. That permits about eight hours of outages a year. When the economy was built around incandescent bulbs and electric motors, three nines was more than enough to keep the wheels of industry turning. But microprocessor-based controls and computer networks demand at least 99.9999% reliability, or "six nines", amounting to no more than a few seconds of allowable outages a year. And that is just a start. The report estimates that the quality of electrical power must reach "nine nines"—milliseconds of faults a year—before the digital economy can truly have the right quality power to mature.

Over the years, various pieces of back-up equipment have filled in during outages, but most of the technologies available today barely deliver the quality needed. Hospitals, phone companies and military bases deploy banks of generators to ensure that their operations stay up and running for 99.99% of the time. But that still amounts to minutes of outages a year. Similarly, most high-tech companies have generators to supplement their power needs, but they also add "uninterruptable power sources" that use batteries to power computers until the generators kick in. Each solution, however, introduces its own problems. Generators do not react fast enough and can deliver dirty power of their own. Meanwhile, batteries are expensive to maintain and may not react fast enough.

Innovations in electrical-power handling promise to improve matters considerably. At the centre are power-chips, first developed in the early 1980s but only now reaching their full potential. Power-chips based on metal oxide semiconductor field-effect transistors (MOSFETS) and integrated bipolar transistors are produced by such firms as International Rectifier of El Segundo, California, IXYS of Santa Clara, California, and Advanced Power Products of Portland, Oregon. They work by splitting a stream of electrical power into tiny packets that can be reconditioned into a more appropriate form. Power-chips can also switch between grid and stored power in milliseconds to ensure uninterrupted power.

Until recently, however, such chips could only switch small amounts of power at high resistance and low efficiency, relegating them to small, niche applications. Now they are capable of switching at much higher voltages and currents in ever shorter times. More to the point, it is only recently that users have learned

how to exploit them properly in order to solve their problems. International Rectifier, which holds many of the patents for MOSFET power-chips, expects the devices to penetrate all electrical equipment—from computers to electric motors and even light bulbs—yielding significant efficiency gains in addition to delivering cleaner, more reliable power.

Coupled with the new power-chips are power-storage innovations that deliver short bursts of power quickly. Among the most promising of these are flywheel systems, which store energy in rotating discs that connect to generators whenever the power is interrupted. Flywheels take up a fraction of the space of lead acid batteries and all but eliminate the latter's maintenance problems. New systems developed by companies such as Active Power of Austin, Texas, and Beacon Power of Woburn, Massachusetts, use composite and steel flywheels rotating at up to 20,000 revolutions per minute to deliver bursts of power that can last as long as 30 seconds.

Meanwhile, superconducting electromagnets made by firms such as American Superconductor of Westborough, Massachusetts, and ultra-capacitors from the likes of Maxwell Technologies of San Diego, California, can deliver bursts of power and be recharged quickly and without any degradation. When coupled with the new power-chips, these systems can switch hundreds of volts of electricity instantaneously, making them ideal for large manufacturing plants and even for sub-stations on the grid.

The acme of all that development is what Mr Mills calls the "silicon power plant", developed by power equipment makers such as Emerson Electric of St Louis, Missouri. These plants deliver megawatts of "high-nine" electric power to computer- network centres that house critical servers and hubs for major corporations and telecom carriers.

Despite all the advances, however, some planners in the electrical power industry warn that there is a possibility of reliability-overkill. With each additional "nine" of reliability, costs can rise ten- to 100-fold. At "three nines" a kilowatt-hour costs about 10 cents. At "five nines", it will cost $20 when investment is taken into account. At "six nines", it could cost $1,000. Yet not all computer systems need such faultless reliability. Indeed, any company considering an investment in powercleaning should work out exactly how much a glitch would really cost its operations compared with the investment involved. The differences might be a powerful incentive for making do.

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REPORT: TELECOMMUNICATIONS

The shape of phones to come

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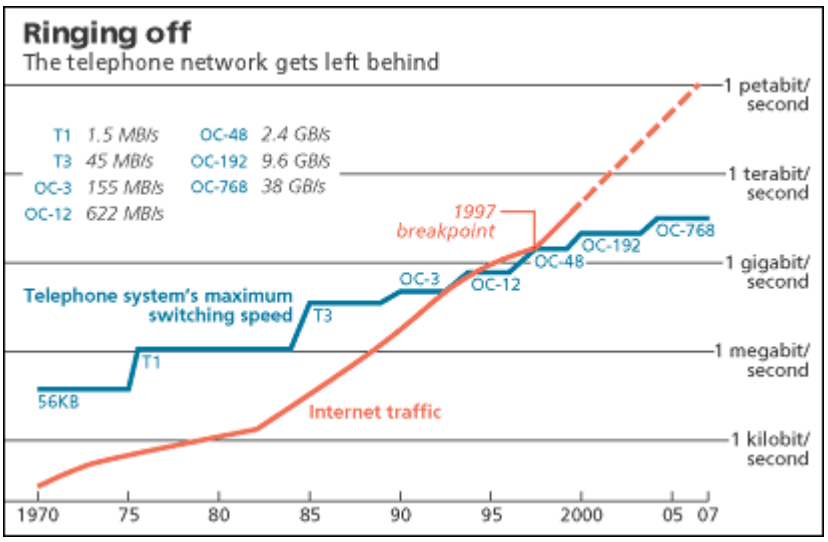
From The Economist print edition

Starting as a hobbyist movement five years ago, "Voice over Internet Protocol" is quietly remaking the telephone system worldwide. It is one of the venerable network's biggest overhauls in decades—but not its last by a long way

WHATEVER happened to the promise of being able to make telephone calls to the far side of the world for free, courtesy of the Internet? Five years ago, it was widely expected that people would, by now, be making their long-distance calls from something that may have looked like a telephone but was actually a personal computer in disguise. By all accounts, e-phone was going to be even bigger than e-mail.



It all seemed so simple. As words were spoken into a microphone attached to a PC, the message would be digitised into a string of the zeros and ones of computerspeak. Instantaneously, the data stream would be compressed and chopped into tiny "packets", each with its own destination address and code to mark its position in the message chain. The packetised voice message would then be squirted over the Internet just like any other chunk of data—be it an e-mail, web-page or piece of software. As the data packets arrived at the receiving end, a computer would reassemble them into a string of sounds and play them instantly back over a microphone.

The best part of Voice over Internet Protocol (VoIP), as the techies dubbed it, was that—apart from the access charge of around $20 per month that most users pay for a dial-up connection to the Internet—phone calls could be made from Tulsa to Timbuktu for the price of a local call. So why do the vast majority of long-distance and international calls, whether from work or home, continue to rely on the pricey old telephone system?

To be sure, dozens of start-up firms—with names such as Genuity, NetVoice, ITXC, Net2Phone, iBasis, PointOne and Go2Call—rushed to arbitrage the price difference between sending calls over the traditional telephone system and transmitting them over the Internet. Starting from 60m minutes-worth of VoIP traffic in 1997, people initiating calls from a PC accounted for 3.4 billion minutes by 2000. But that apparently huge number is actually equivalent to a mere 3% of the 120 billion minutes of international calls currently made using the conventional telephone system. No surprise, therefore, that VoIP is widely seen as a technology that has failed to live up to its promise.

All the more so now that a number of start-up firms offering local VoIP services have been badly bruised by the collapse of the dotcom bubble. Apart from the VoIP service providers, there is also a glut of VoIP equipment makers that have been left chasing a market that has not grown anywhere near as fast as

expected. “With too many IP gateway and softswitch offerings out there,” says Jahangir Raina of iLocus.com, a market research firm based in Britain, “consolidation seems inevitable.”

With most to lose, the traditional telephone companies were VoIP’s fiercest critics. They resented the way that VoIP threatened to take an axe to their principal source of profit, just as growing deregulation and competition was beginning to do the same. Unlike Internet users, who generally pay just a flat monthly fee these days, telephone customers are billed not only standing monthly charges but also for the duration and distance of the calls they place. Because long-distance calls once involved chains of operators making connections along a route, telephone users have grown accustomed to the notion of having to pay for distance.

In reality, it now costs the telephone companies little more (and often a whole lot less) for customers to call long distance than to call next door. For one thing, the long-distance switching has been fully automated. For another, the most expensive part of the telephone network these days is the so-called “last mile”—where individual connections that carry little traffic have to be laid in the ground or strung along telephone poles between local exchanges and the home or office of every customer.

Clash of cultures

To be fair, the telephone companies also had genuine concerns about VoIP’s technical adequacies. Ever since the Scottish-born audiologist Alexander Graham Bell invented the telephone in 1876, the whole concept of the public telephone network had been based on the principle of allocating a dedicated connection from one end to the other for the duration of a conversation. When one party put the phone down, the circuit was promptly switched open again so it could be used by other callers.

Switching thus lay at the heart of the telephone industry’s culture. And the industry’s huge investments have been made not only in copper and optical cables in the ground, but also in powerful switching computers that open and close connections so that a dedicated circuit can be allocated to each customer for the duration of a call.

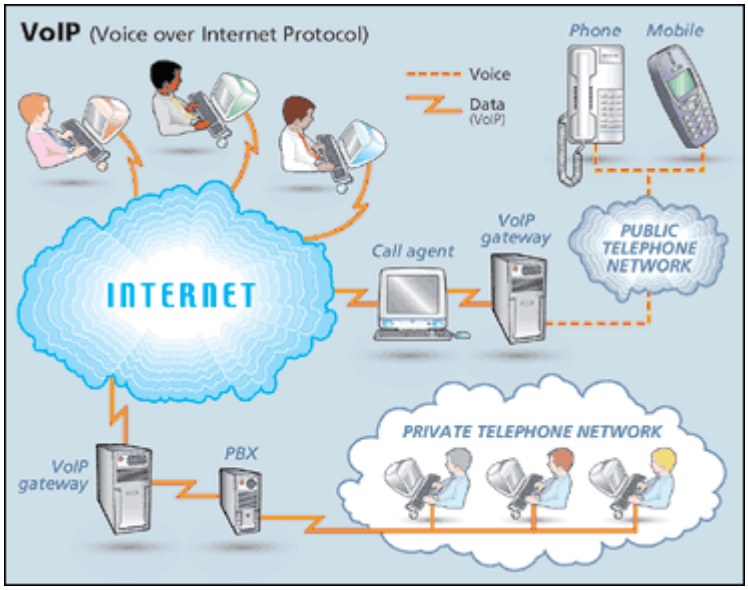
This technological feat is carried out using a five-layered hierarchy of switching centres, with the “central office” being (misleadingly) in the local neighbourhood at the edge of the network and the “toll”, “primary”, “sectional” and “regional” centres being situated ever closer to the network’s inner sanctum. Years of experience had taught telephone engineers (“Bellheads”, to the trade) that only by switching whole lines to individual callers could they guarantee the quality of service deemed necessary.

By contrast, the whole point of the Internet is that it is essentially unswitched. Packets of data get squirted from one routing computer (“router”) to another, taking paths which, at that particular instant, allow them to complete the next leg of the journey in the shortest possible time. A single message arriving at its destination may contain packets that have taken dozens of different routes to get there.

That is both the strength and weakness of the Internet. Its ancestor, Arpanet, was designed during the cold war when it was feared that a centralised and hierarchical telephone network could be vulnerable to nuclear attack. What was needed was a decentralised network in which no one node had overall control. Such a packetised network might operate more slowly if some of its nodes were knocked out, but the packets would always find other ways to get to their destination. In brief, the messages would get through.

But there is a price to pay for the Internet’s ruggedness. Chopping the data into packets at one end and reassembling them at the other takes time and consumes computing power. Worse, some packets take a wrong turn and arrive many milliseconds, or even whole seconds, later than expected. They are then either dropped (leaving a hiccup in the message that has to be fudged by software) or resent (delaying the message further).

That does not matter too much if the message is a web-page that is being downloaded or an e-mail that can afford to sit around for a few more seconds while all of its bits are assembled. But it matters a lot if the string of data is speech. It is decidedly off-putting to listen to a conversation that is constantly pausing and then racing ahead as recalcitrant packets turn up.



It is no surprise, therefore, that the telephone industry originally considered VoIP to be as much a joke as a threat. Free it may have been, but its stuttering delivery was deemed wholly unacceptable. On a scale of 1 for inaudible and 5 for standard telephone quality, Internet telephony was rated an inadequate 3.5. No self-respecting Bellhead was going to allow such an upstart as VoIP to change the tried-and-true way of setting up a decently audible call, allocating a dedicated circuit from end to end, dismantling the circuit after use and billing the customer for the service.

But that was before cellular phones taught people to accept hisses, crackles and gargling sounds on the line. Rated on the telephone industry's quality-of-service index, mobile phones score 4 at best—and frequently a good deal less. By 1998, with competition in the long-distance and international business becoming cut-throat, the telephone companies secretly began to wonder whether they really needed such a gold-plated network. That was when the full cost of an Internet call was already less than five cents a minute compared with the 11 cents that a circuit-switched call was costing the telcos. Projections showed that, by 2003, an Internet call would be down to 2 cents a minute, versus 7 cents for circuit-switched.

Besides, it was only a matter of time before the data traffic on the Internet would overtake the voice traffic on the telephone network. Once that happened (as it did in 1997 in America), then the telephone companies would have to accept that voice was about to become just another commodity alongside data services. And the telcos' customers would then have to be given good reasons to carry on using them.

When services are commoditised, notes iLocus's Mr Raina, it means adding value to what you provide without incurring high cost. One way to do that is to build more high-margin features—caller identification, call transfer, follow-me around, conferencing, calling cards, free numbers—into the basic low-margin telephone service in a way that adds only marginally to the operating cost. And the cheapest way to do that? Stop switching circuits and send packets instead.

Getting religion

The first of the telephone behemoths to get the message were the equipment makers—Lucent Technologies and Nortel Networks in North America, followed later by Siemens, Ericsson and Alcatel in Europe. Lucent acquired a firm called Ascend in 1999 for its VoIP know-how. And one by one, either through acquisitions or crash-programmes in-house, the old-line equipment firms rushed to join the Internet-telephony fray before Cisco Systems, the leading supplier of Internet gear, and a bunch of feisty newcomers such as Clarent, Sonus Networks, AudioCodes and Ditech carved up the market for VoIP equipment among themselves. Even after the "Nasdaq correction" in March 2000, more than $1 billion of venture capital poured into firms developing VoIP technology.

Basically, what VoIP offered was a way for the telcos to use their bandwidth more efficiently. Conventional telephone calls require a bandwidth of 64 kilobits per second (kbps). By contrast, the codec (compression-decompression) tricks used by VoIP to snip out the pauses and quiet parts of speech before transmission (and then reinsert the missing blanks at the receiving end) allow Internet calls to get away with less than 6kbps. Needing to send a tenth as many bits of information per telephone call

translates into a large increase in the amount of traffic that can be squeezed through the telcos' pipes. In turn, that spells a cheaper way for them to meet the cost of having to double their long-distance carrying capacity every five years in order to meet demand.

Despite adding lots of optical cables, much of the voice traffic on the telcos' circuit-switched network still runs on low-speed "T3" lines. These offer a modest bandwidth of 45 megabits per second. By comparison, IP data networks—even out at the edge of the network—use at least "OC-3" and "OC-12" optical cables that are capable of 155 and 622 megabits per second respectively. With the bulk of the telephone traffic travelling over such slow lines, making the whole of the network run at IP speeds was going to be impossible or at least prohibitively expensive. In the patois of the technology, telephone networks do not scale easily.

But while the Internet wins hands down on speed and ruggedness, what about its inability to handle speech properly? That, actually, has proved somewhat less of a problem than expected. One approach adopted by the Internet Engineering Task Force, a voluntary body that promotes new technical standards, is an enhancement called the Resource Reservation Protocol. This sets aside a bit of the bandwidth on the Internet's backbone for those kinds of packets (such as audio) that have critical timing requirements.

An extension of this is called "Diffserv", which lets Internet service providers offer different levels of service to different users. It does this by allocating a portion of the bandwidth for priority traffic which varies with the demand. Another dodge is to fragment large data packets so that unacceptably long delays are less likely to occur.

Finally, a number of equipment suppliers, including Siemens in Germany and Newbridge Networks in Canada (now part of Alcatel of France), have developed proprietary techniques that allow carriers to offer various qualities of service over the Internet, ranging from data (lowest grade) to speech, music and full-motion video (highest grade). They do this by making the clunky IP packets masquerade as the small, specialised packets used by a high-speed form of networking known as Asynchronous Transfer Mode (ATM), a technology that combines the quality of the telephone world's circuit-switching with the robustness of the Internet's packet-switching. Unlike an IP packet, however, an ATM packet is a fixed size (a tiny 53 bytes) and is transmitted over a predetermined path instead of being sent by the most convenient route available at that instant.

The process of boosting the quality of VoIP has made it a bit more cumbersome than it would be otherwise. Even so, Michael Barkan at Lucent reckons that an Internet telephone call equal in quality to the best carrier-class call needs no more than 12kbps of bandwidth. For telephone carriers struggling to meet the explosion in demand, adopting VoIP still translates into a five-fold improvement in capacity.

Unplug this, connect that

VoIP's change of fortune came in 2000 when, one by one, the large telephone carriers started to replace parts of their traditional infrastructure with various types of IP-based multi-service networks. The irony is that the new-style carriers that helped create the IP telephony business when it was still a niche activity for PC hobbyists have found the going tough and are facing a shake-out. Meanwhile, VoIP is thriving within the traditional telcos that tried to stifle it.

In America, SBC Communications has deployed VoIP gateways from Nortel; AT&T and Verizon have bought Lucent's softswitches and IP gateways. In Europe, Cable & Wireless has signed a $1.4 billion deal with Nortel as part of its plan to build a $5 billion global IP network. It wants to offer corporate customers such features as virtual private networks (dedicated lines over the Internet), local-area networks and wide-area networks as well as Internet telephony, all as a unified service.

But it is Asia which is adopting Internet telephony faster than anywhere else. China already generates more VoIP traffic than any other country except America. In Japan, 12% of all international calls now go over IP networks. The reason for all this activity in Asia is good fortune: deregulation of telecommunications arrived in the region just as VoIP finally became mature enough to do the job. With no legacy equipment to worry about, the new telephone carriers entering Asian markets were able to adopt VoIP. Incumbent carriers then had to follow suit.

Though far from easy, the migration from circuit-switching to packet-switching that the telephone carriers have now embarked upon promises a neat way to kill two birds with one stone. In the short

term, it gives them a means for delivering more value to their customers while spending less on operating costs. In the long-term, VoIP also provides a stepping stone to what ought to be their ultimate goal: the ability to offer a unified, IP-based, multi-service network that does the job not only of today's telephone system and Internet, but also the internal telephone networks and private data networks that organisations use to shuffle their information around.

Three steps ahead

To get there, however, the telephone companies are having to tread carefully. The first step is to replace their Class 4 switches (toll centres and tandem exchanges that funnel calls between central offices) with IP gateways and routers, so that the bulk of their long-distance and international traffic can then travel in Internet-style packets along with the data and multimedia traffic. The next step will be to take the packetisation of the network farther out towards the edge of the network, replacing their Class 5 switches (central offices) with IP gear—so that local calls, data and multimedia can all travel together as well. As a final step, the telcos will need to push full IP services all the way out across the "last mile" to the home. By then, a radically new type of telephone will be available (see article).

Before that, however, companies are going to be pressing their local carriers for IP solutions that allow them to merge the two disparate networks—one for telephone and fax, the other for data and multimedia—that they currently have to maintain separately at considerable expense. With e-mail and data displacing voice, telephone traffic is set to become an increasingly minor part of the average company's communications bill. Already, firms with heavy communications needs are beginning to replace their clunky PBX (private branch exchange) machines with IP equipment, freeing them to run their telephone and fax services on their high-speed data networks.

The market for corporate VoIP looks particularly promising. Richard Heaps, the chief operating officer of Clarent, expects 2001 to be the year that demand for IP telephony within large companies finally takes off. Until now, manufacturers such as Clarent, one of the top three suppliers of VoIP gateways and gatekeeper software, have had to push their products on to the service providers. But now that the corporate sector is beginning to take network convergence seriously, the equipment makers expect to see some pull from the market instead.

Where all this is leading is hard to say. But one thing is certain: the Internet, as it is known today, will not be up to all the demands that are about to be made on it. A wholly new, far bigger, packet-switched network—one that combines the scalability of the Internet with the quality and global reach of the telephone system—is going to have to be built from scratch. "This new network will be bigger than the world's telephone system, more revolutionary than the Internet, and have the potential to create more wealth than even the PC industry," says Paul Johnson of Robertson Stephens, an American investment bank. In short, it will be the network that connects everything to everything. When? The foundations are already being dug.

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REPORT: MANUFACTURING

The solid future of rapid prototyping

Mar 22nd 2001
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The future of rapid prototyping—used for "printing" 3D models of engineering parts direct from designs on a computer screen—depends on being able to turn out real components made of real materials instead of plastic look-alikes. Instant one-step manufacturing is the goal

GONE are the assembly lines. The clank, whirr and whine of a thousand robots cutting metal, injecting plastic and emptying moulds is no more. A Luddite conspiracy is not to blame, nor the inexorable rise of a service economy. It is all a result of a quiet revolution on the laboratory floor.

Order an artefact from a virtual stockroom or simply dream one up. In a matter of minutes, the stuff of your imagination will be born in the world of things you can see and touch. From the innards of a new box of tricks emerge parts for a car, custom-built medical implants, miniature batteries. Think of anything you like, and it can be made to order, without the need for special tools, at the push of a button. How? A computer linked to a printer, printing not words on paper but solid objects.

Futuristic mumbo jumbo? The idea of a "rapid manufacturing machine", as it is called in the business, is not quite science fantasy. True, building a machine to make 3D objects direct from computerised design data is something of a tall order—especially if its products must be as high-quality and robust as their machined or injection-moulded cousins. But their precursors—otherwise known as rapid prototyping machines—are already on the market.

Dumb models

There is, of course, a hitch. Commercially available rapid prototyping machines do indeed make prototypes. But with a few notable exceptions, they are just that—dumb models, not finished parts, made mainly from plastic with an accuracy and surface finish that is little better than a child's attempt at sculpture. The goal of a universal maker of things remains a distant dream. In a nutshell, today's rapid manufacturing technology is neither very rapid nor very capable of manufacturing, and the obstacles to making it so are huge.

Huge, but not insurmountable. The new machines must be faster, cope with a far wider range of materials, and handle vast flows of information. They must overcome the vagaries of temperature and the intractability of bonding. But new research is bringing all this within reach—and with it, machines that can "print" parts for spacecraft, timed-release drugs and even the electronics of a mobile phone.

A rapid prototyping machine makes a solid model from the bits and bytes of the design information stored in a computer. This map of the component's geometry comes either from computer-aided design (CAD) software that allows designers to draw and visualise parts in three dimensions, or from a scanner that provides a digital image of the components as envisaged on paper. An algorithm (sequence of instructions for solving a specific problem) slices the shape into cross-sections and feeds them to the rapid prototyping machine, which then builds the model layer-by-layer according to the computer's instructions. The first layer's geometry is defined by the shape of the first cross-section, the second layer is bonded to the first, and so on, until fabrication is complete.

"Because the expense of making tools no longer figures in the equation, the economics of mass production will give way to mass customisation. Parts will be made in production runs not of 1m or even

Various versions of this technology are currently on the market. Designers routinely use it to make prototypes, to test their ideas before they hit the shops. But take a moment to appreciate the implications of making finished parts using this type of technology. Most metal, ceramic and plastic parts are cast and stamped in enormous numbers to justify the huge expense of tooling—

the slow and painstaking process of making the necessary moulds and dies. Designs are constrained by the tools needed to realise them. Long thin parts tend to break when moulds are peeled away; undercuts are tricky.

a few thousand, but of one.”

But as Phillip Dickens of De Montfort University in Leicester points out, if rapid manufacturing machines can make parts in one step, such constraints will disappear. Designs will be virtual, while trial runs can be printed out in minutes. Because the shape of a manufactured product will depend only on its computerised design, the designer’s imagination can be given free rein: fuel cells can be microscopic, steering wheels ergonomic. And because the expense of making tools no longer figures in the equation, the economics of mass production will give way to mass customisation. Parts will then be made in production runs not of a million or even of a few thousand, but of one.

This is not going to happen overnight. Rapid prototyping machines rarely deliver the same quality as conventional manufacturing processes for the same price. But those industries where the cost of individual parts is high or where products are highly customised—eg, the aerospace and medical industries—should be natural candidates for the adoption of rapid prototyping for manufacturing. Some companies are already making the techniques pay.

Good enough for space

Rocketdyne Propulsion and Power, a pioneer of rapid manufacturing in California, has been quick to catch on to the idea. Its engineers are growing metal and glass-filled nylon parts for NASA’s space shuttle fleet, on a commercially available rapid prototyping machine made by DTM Corporation of Austin, Texas. The technique that Rocketdyne has perfected, called “selective laser sintering”, was invented originally by Joseph Beaman and Carl Dekker at the University of Austin. A laser traces out a pattern on the surface of a layer of powdered metal, fusing the tiny particles into a solid—rather like welding with lasers, but at much lower temperatures. A new layer of powder is rolled out and the laser scans a different pattern on it, building up the part layer by layer.

But the demands of the aerospace industry are high, especially when astronauts’ lives are at risk. Rocket engines have to withstand extremes of temperature, so surface finish and material strength are paramount—qualities that rapid prototyping machines find hard to deliver. Working with metals is particularly tricky: the scanning of the laser must be precisely controlled, or else the temperature of the surface will vary—warping the metal and creating ripples due to shrinkage. Rocketdyne’s manufacturing success resides in its materials know-how and its obsessive approach to quality control. To avoid the usual problems with metals, the company has developed proprietary titanium alloys and monitors every step of the process with attention. Rocketdyne’s rapidly manufactured parts are already in orbit. The company helped to build the International Space Station.

Align Technology of Santa Clara, California, has also taken rapid prototyping techniques to heart—to make plastic braces for straightening teeth. A dentist prepares a mould of the patient’s teeth and scans it into a computer. The dentist manipulates the stored shape of the teeth until they are perfectly straight and then uses the computer to design a series of braces, each shaped to fit a successively less crooked smile.

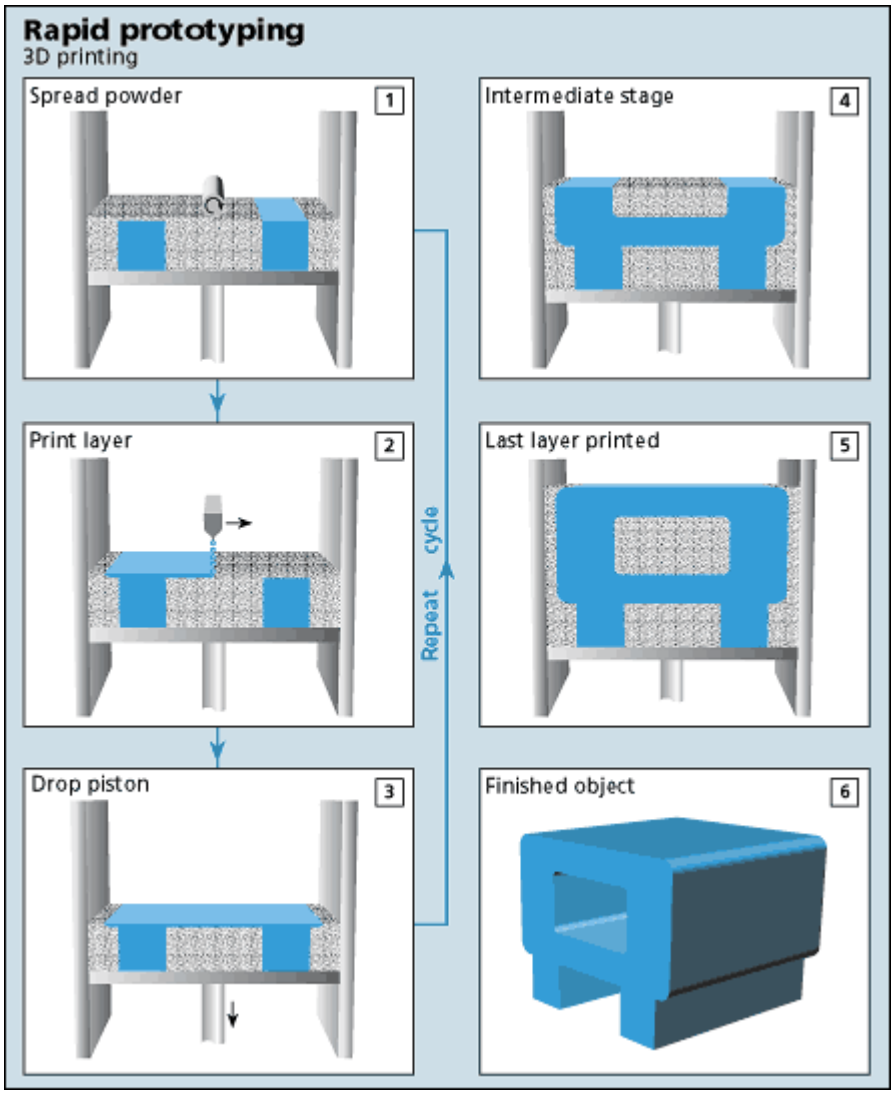
The trick is then to print out the braces—using a stereolithography machine made by 3D Systems of Valencia, California. A powerful ultra-violet laser dances over the surface of a lagoon of photosensitive plastic in liquid form, which hardens as it is zapped by the laser. The platform supporting the developing brace then drops by a fraction of a millimetre, immersing the hardened layer in the polymer bath. This process continues, until the last layer is traced and the finished brace rises triumphantly from the viscous pool.

At present, Rocketdyne and Align Technology are exceptions rather than the rule. The machines they use are industrial-scale equipment selling for $1m apiece. Because their parts are highly customised, fabricating them with traditional techniques would be prohibitively expensive. In their case, rapid manufacturing is a viable alternative. To most manufacturers, however, the economic virtues of these fledgling techniques (compared with traditional tool making and casting) are not so readily apparent. But new technologies, based on the familiar ink-jet printer, may be about to change all that.

Materially different

Terry Wohlers, an American rapid prototyping expert, believes that the 3D ink-jet printer is the most promising technology for producing a general-purpose rapid manufacturing machine. Instead of squirting a two-dimensional layer of ink on to paper, the 3D Systems' Thermojet squirts fine droplets of molten plastic, which harden as they cool. With the resolution and precision of its laser-printer cousin, the print-head sweeps back and forth, laying down intricately shaped strata of warm plastic beneath.

The great advantage in this method is that it is cheap. 3D Systems sells its machine for printing prototypes for $55,000. But unlike prototypes, the plastics used in manufacturing have to be tough, durable and heat resistant. Instead of trying to squirt plastics that manufacturers use in practice, 3D Systems is inventing new ones—especially plastics that mimic the properties manufacturers are familiar with, but which are compatible with the rigours of an ink-jet machine.



This is fine for squirting materials that liquefy easily. But the only metal like this is mercury, which is of little use for making car parts. The "3DP" process invented by Emanuel Sachs, Michael Cima, Nicholas Patrikalakis and Samuel Allen at Massachusetts Institute of Technology (MIT) neatly circumvents this problem by spraying a jet of liquid glue into a bed of a powdered mix of metal, ceramic and polymer. The glue binds the powder and a layer of powder is laid down and rolled flat; the process is then repeated. Finally, the excess powder is blown away and the finished object is revealed (see illustration above). Z Corporation of Burlington, Massachusetts, which licenses the technology, uses a conventional print-head from an ink-jet printer to squirt glue into corn starch—turning out a prototype of, say, a mobile telephone case in under an hour and for less than $10.

Critics point out that few actual products are made entirely of solid metal, ceramic or even plastic. It is an important point. But Dr Sachs notes that most individual components used within a product are made from a single material. If metal and ceramic parts can be made by rapid manufacturing, it is a big win for two reasons. First, no tooling is required, so manufacturers can respond quickly to fresh demands from designers and customers in ways they cannot do today. Second, parts with complex internal shapes can be made, allowing lots of interesting applications that are currently either impossible or too expensive. In short, the inability to use multiple materials is not so much an obstacle to manufacturing finished

products this way, but more a motivation to find methods of doing so.

To this end, one of the biggest challenges is to develop methods for squirting many different materials from the same print-head, so that the composition of a part can be tailored to the designer's need. That means achieving unprecedented control over the material's properties—especially its hardness, electrical conductivity, reflectivity—on scales of a few hundred millionths of a metre or less. But if it could be done, the possibilities would be endless: microscopic sensors embedded in fibre-optics, devices to control chemical reactions, metal parts graded for heat transfer along their length.

Achieving such a goal is, of course, more difficult than it sounds. The principle is simple: decompose the part into volume units ("voxels") and tell the printer which material to spit out at each point. Z-Corporation is already there. Six months ago, the company introduced a printer that can squirt its material in colour. Toy companies, which make colourful models that are complex on the surface and uniform within, love it. But the problem for industrial parts, besides convincing manufacturers, is how to handle the quantity of data involved.

Dr Sachs and his colleagues at MIT think they have a solution. The design for the part in question is imagined to be a mesh of tetrahedra. Using the material at each corner of the tetrahedron as a rough guide to what happens inside it enormously reduces the number of calculations that the computer has to perform. Then the meshed part is sliced into planes as normal. The next and crucial step is to apply a set of rules, called "half-toning algorithms", for breaking the smooth composition information in each layer into a stream of digital bits. (This is like taking a photograph and printing it in black and white in a newspaper: the photo has to be broken down into picture elements or "pixels", each with its own level on a discrete "grey scale", in such a way that the overall effect is a reasonable representation.) The MIT team has found a way of doing this in 3D using conventional 2D algorithms, applied to one slice at a time, but cleverly adapted so as to take account of the material in the previous and subsequent slices.

The MIT group has already used the technique to print colour on the inside of parts with complex internal geometry. The method is close to finding commercial applications. Therics, a company based in Princeton, New Jersey, has started using the technology to print a combination of liquid drug and solid polymer. The result is a drug-filled capsule which controls the release rate of its contents. Because the capsules are small, the firm can program its printer to lay down many thousands of pills at the same time—equivalent to some 60,000 doses an hour—opening the way to fast, industrial-scale production. Therics is currently in the early stages of clinical testing and expects its product to be on sale within two years.

Not only can the MIT process handle multiple materials, but it can also cope with an unprecedented range of materials—even biological cells. Linda Griffith, a tissue engineer who also works at MIT, is using a Therics 3D printer to manufacture complex scaffolds from biodegradable polymers, on to which cells are seeded. The idea is to make customised medical implants which can encourage, say, broken bones to knit together again.

Lightning fast

As a manufacturing technology, the problem with ink-jet printing is that it is relatively slow. And in modern manufacturing, speed is essential. The Pentagon's Defence Advanced Research Projects Agency (DARPA) has launched a programme with four companies that is seeking to 3D-print electronic components directly on to the case that will house them, which should be a much faster way of making them. At present, integrated circuits are made using a lithographic technology derived from silk-screen printing. A huge amount of engineering effort goes into designing and preparing the sheets of transparent film with their patterns of circuitry to be printed repeatedly across a silicon wafer. The enormous cost is justified by the speed of production.

But look inside a mobile phone or PC, and there are just a few integrated circuits but dozens of discrete components—resistors, capacitors and diodes—surrounding them on the printed circuit board. What DARPA is aiming to do is to print the entire circuit board (chips and discretes together) directly on to the interior of the gizmo's case, without having to flow-solder the parts together. Apart from being more robust, such a process would be cheaper—provided it could be done fast enough.

A company called CMS Technetronics in Stillwater, Oklahoma, has invented a micro-dispensing stylus to do just that. Under instructions from a CAD file, the stylus tip (measuring only a few thousands of a millimetre in diameter) works like a tiny tube of toothpaste, dispensing a series of different liquids in a

layered pattern. A laser selectively zaps the liquids, solidifying them and fixing them to the surface. The system includes a scanner that recognises shapes, allowing a gimballed stylus to print on curves. The whole contraption works faster than one might imagine. Traditional screen-printing manages 50 centimetres per second. CMS Technetronics's system, which prints electronic components at a rate of 40 centimetres per second, is respectably close to this. The company hopes that a version of the technology with between eight and 12 styluses will be tested in industry next year.

Making it

Will rapid manufacturing technology kill off traditional production processes? Not in the short term. Rapid prototyping is already used widely by design engineers, but installing it on the factory floor is something different. But that could change over the next ten years, according to Dr Dickens in Leicester. As 3D printers speed up and new, cheaper materials are invented, the cost of rapid manufacturing is likely to fall quite sharply. Experts believe that if printer costs were halved, rapid manufacturing could become feasible for mass production.

The changes in manufacturing would be profound: tool makers would find themselves out of a job, injection-moulders likewise. Designers would be free to make what they wanted, not what they could. And do-it-yourself consumers would feel the benefits as well. Break the TV remote control, and you might retrieve its design from the Internet and have it made at a 3D print shop in the neighbourhood.

Where the technology will head next is anybody's guess. But one thing is for sure: 3D printing is an innovation that promises to be at least as radical as its 2D forebear. The future of rapid prototyping—the technology used to make 3D models of parts direct from computer design data—will lie in making those parts themselves. But on the way to instant "one-step-manufacturing", there are still mountains to climb.

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MONITOR

Through a glass brightly

Mar 22nd 2001
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A new approach to making optical fibres

OPTICAL fibres can guide light over hundreds of kilometres by exploiting differences in the refractive index to bend a light beam—just as water in a swimming pool bends the light entering it from the air above to make the pool appear shallower than it actually is. In the case of the optical fibre, the core is made of a glass that has a high refractive index, bending light strongly, while the outer cladding has a lower refractive index and thus bends the light less. The net effect is to make light signals bounce along the core as though they were in a pipe with a mirror-like finish.

A new approach to making optical fibres takes the pipe analogy one step farther, by laying down bundles of microscopic pipes along the length of the fibre. These “holes” through the glass do the same job as a difference in the refractive index—and much more besides. Although more expensive to make than conventional optical fibre, several companies are rushing to perfect commercial applications.

COM Denmark

A cross-section through the new type of fibre shows holes arranged neatly in an array like atoms in a crystal. This turns out to be more than just an analogy—hence the name, “crystal fibre”, coined for it. Crystal fibres work in one of two ways. In “index-guided” crystal fibres, one or more holes are missing at the centre of the array. Without the holes, the glass at the centre has a higher density, and thus a higher refractive index than its more porous surroundings. Light entering the core is therefore confined much as it would be in a conventional fibre. The advantage is that the effect is achieved without having to use two different kinds of glass. An added benefit is that the light can be squeezed into a much narrower core than is the case in conventional fibres.

In the second mode of working, the crystal fibre uses the regular array of holes to influence light in much the same way as the arrangement of atoms in a crystal can determine whether electrons are able to travel easily through it—and hence whether the crystal is electrically conducting or not. For instance, graphite and diamond are both made of carbon, but the difference in the crystalline arrangements of their carbon atoms means that graphite conducts electricity while diamond is a good insulator. In the same way, the pattern of holes in a crystal fibre can create the equivalent for light of a graphite core and a diamond cladding.

For both modes of crystal fibre, the pattern of holes is generated by stacking hollow glass tubes a millimetre or so in diameter to form a rod several centimetres thick. The rod is heated until the glass flows easily, and then drawn into hair-thin fibres. In the filaments, the same cross-sectional pattern of holes is preserved, but on a microscopic scale. In practice, getting this process to work is one part science and two parts cookery. Thus, manufacturers—only a handful have mastered the process so far—are loth to divulge details of the production technique.

One that has is a Danish company called Crystal Fibre, a spin off from the Technical University of Denmark. The company has developed advanced software tools for predicting the optical properties of new fibres so that it can quickly identify which types of hole array out of the literally infinite range of possibilities have industrially interesting properties.

One example the company has developed is a crystal fibre that squeezes light into such a narrow core that the intensity of the light modifies the optical properties of the glass itself. The “non-linear” properties of the resulting fibre make light sent down it at one wavelength shift into a range of other wavelengths. This provides a means of switching a signal between two wavelengths—a neat trick for using bandwidth more effectively.

With a different hole design, crystal fibres can do the opposite trick as well, spreading the light much more evenly across the width of the fibre—and thereby reducing non-linear effects. This could be important in future high-speed links, because when rates of data transfer approach 100 gigabits per second, non-linear effects begin to mess up the signals. The new fibre could help eliminate such problems.

With yet another pattern of holes, it is possible to generate so-called “endlessly single-mode fibres”, which transfer light at widely different wavelengths with exactly the same bell-shaped intensity profile. Such a single-mode profile is desirable for telecommunications. So far, this has been possible only at infra-red wavelengths and, even then, only in a narrow range of wavelengths. But crystal fibres push the range of single-mode wavelengths right into the visible part of the spectrum, opening up huge new tracts of wavelength for telecommunications.

For the time being, production methods have proved difficult to scale up. But Crystal Fibre’s director, Michael Kjaer, is sanguine about the potential of the company’s product. The niche markets for crystal fibres are still attractive for a small firm, giving it a foot in the door before large manufacturers such as Lucent and Corning really get going. Given the frantic pace of development in all-optical networks, that is likely to be a matter of months rather than years.

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REPORT: DATA NETWORKS

Upgrading the Internet

Mar 22nd 2001
From The Economist print edition

The Internet is like an overloaded highway that needs to be upgraded. But if done badly, the Internet's ability to support innovative, as-yet unimagined applications could be in jeopardy

QUINTESSENTIALLY modern though it may seem, the Internet is in many respects an example of an overstretched infrastructure built in the 1970s. Like any other piece of infrastructure, whether a bridge or a highway, that was designed so long ago, it is groaning under the enormous weight of traffic it has attracted. The Internet now needs an overhaul if it is to cope with the mushrooming demand from millions of additional computers, hundreds of millions of new users, desire for ever-faster connections, and an expected boom in access from mobile devices. Its original architectural structure has lasted surprisingly well. But the time has come to improve the fabric of the network itself: the software protocols on which it is founded.

There is no shortage of things that need to be fixed, nor of ideas about how best to fix them. But according to Vint Cerf—the networking guru who, with his colleague Robert Kahn, devised the Internet's original architecture in the 1970s—two challenges stand out. First, the growing shortage of addresses needs to be dealt with. Second, the network needs to be scaled up to cope with faster connections in an efficient manner. The reason these two problems are so important is that unless they are fixed properly, the "end-to-end" principle on which the Internet was founded could be under threat. And that could have serious repercussions.

End-to-end, in essence, is the idea that the network should be as dumb as possible, and just do one thing: send packets from one place to another, without discrimination. All packets must be treated equally, and their contents are not to be tampered with. Although packets may arrive at their destination in a different order, or may not arrive at all, the advantage is that the machines at each end of the connection do not have to worry about how the packets are delivered. Since no assumptions are made about those packets as they travel across the network, there are no constraints on the uses to which they can be put. In brief, the simpler the network architecture, the better it can cope with new applications.

"The problem is that so far, aside from a few experimental machines, almost nobody is using IPV6."

Indeed, when they designed the Internet's packet-based architecture, Dr Cerf and Dr Kahn had no idea that it would end up being used for the web, video streaming or Napster—all of those ideas came later. "There's a freedom about the Internet," notes Tim Berners-Lee, the creator of the web. "As long as we accept the rules of sending packets around, we can send packets containing anything to anywhere."

In order to maintain the Internet's innovative environment, then, it is vital to preserve its end-to-end nature. But this is far more easily said than done. One danger is that short-term fixes will be adopted that disregard the end-to-end principle, and thus unwittingly hinder future innovation. Worse, now that the Internet has gone from being an academic network populated by geeks and boffins to an artery of commerce, a disjunction is emerging between what is best from a purely engineering point of view and what makes sense commercially. Can the Internet's uniquely vibrant ecosystem, in which innovation flourishes and unexpected new applications can spring up almost overnight, be preserved?

Change of address

The more immediate of the Internet's two big problems, and the easier one to solve, is the shortage of addresses. Each machine on the network is given a number, called an IP (Internet Protocol) address,

which is used to label packets of data sent to and coming from that machine. This makes it possible for two machines to communicate simply by lobbing appropriately addressed packets on to the network, like sending postcards. The problem is that the current specification for IP, called IP version 4 or IPv4, only allows for around 4 billion addresses. Each address is a string of 32 binary digits, or bits, which allows for 4,294,967,296 combinations.

In the 1970s, this seemed like more addresses than would ever be needed. But when the Internet went mainstream in the 1990s, it became clear that IPv4's addressing scheme would have to be extended. Indeed, the way addresses are doled out means that there is already a shortage. Large organisations can reserve several thousand of them, not all of which may end up being used. So, in the early 1990s, work began on a new version of the protocol that, for a start, would allow for more addresses.

When it came to overhauling the Internet's addressing system, the networking wizards did not do things by halves. They proposed a switch from 32-bit addresses to 128-bit ones. In other words, there will end up being a theoretical maximum of the current number of addresses squared, and squared again: around a third of a duodecillion (340,282,366,920,938,463,463,374,607,431, 768,211,456 to be precise). Or, put another way, 4 billion addresses for each of 4 billion people on each of 4 billion planets in each of 4 billion galaxies. This should be enough to cope with expected growth in the numbers of mobile devices, Internet-capable household appliances, and so on for the next few millennia. The new protocol, originally known as "next generation IP", was eventually named IPv6. (IPv5 was an experimental protocol that is no longer used.)

The process of developing IPv6 sparked a vigorous debate. Some engineers felt that since the move to IPv6 would require upgrades to millions of machines, it presented a good opportunity to fix other problems beside the shortage of addresses. Why not add a payment mechanism, security features, prioritisation of traffic, or explicit support for audio and video streams?

Steve Deering, the lead designer of IPv6, who now works at Cisco Systems, took the view that less is more, and that adding fancy features to IP was not in keeping with the end-to-end philosophy. As a result, IPv6 has low-level encryption and authentication features, and support for automatic configuration so that devices can simply be plugged in and start working. But implementing higher-level features such as payment mechanisms, traffic prioritisation or explicit support for media streams was, he decided, unwise—because it would involve second-guessing the future development of the Internet, and thus constraining it unnecessarily. The Internet's original designers had not made any such assumptions, and the result was a surge of innovation. Making the wrong assumptions, he worried, might prevent innovation in future.

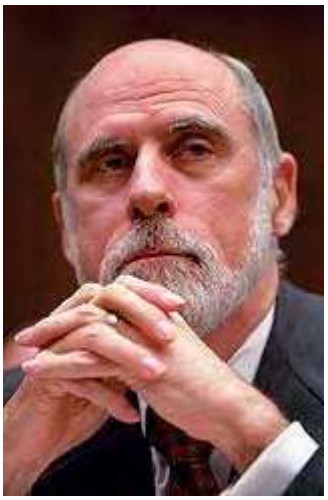
IPv6 software is now available, at least in prototype form, for almost all computers, and it is increasingly supported in network hardware (notably in routers, which direct traffic) as well. Perhaps most importantly, IPv6 has been adopted as a standard by the makers of "third-generation" mobile telephones, which hope to sell hundreds of millions of Internet-capable phones, and would therefore have run right into the shortage of IPv4 addresses. One of the cleverest things about IPv6 is its ability to work alongside IPv4. Streams of IPv6 traffic can be wrapped up inside IPv4 packets, allowing computers that understand IPv6 to communicate via intermediate links that do not. The idea is that to start with, there will be a few islands of IPv6 machines in a sea of IPv4; but as IPv6 spreads, there will eventually be islands of IPv4 in a sea of IPv6. The problem is that so far, aside from a few experimental machines, almost nobody is using IPv6.

Instead, the end-to-end model is already breaking down. The shortage of addresses is widely dealt with via an inelegant fudge called network address translation (NAT). This involves putting a computer between, say, a company network and the Internet, and relabelling passing packets to enable a large number of machines on the company network to share a smaller number of IPv4 addresses. This is in violation of the end-to-end principle, since the network is no longer dumbly passing packets from one end to another but is meddling with their innards, and it causes software that relies on particular machines having a fixed IP address to stop working. Ray Ozzie of Groove Networks, the man behind Lotus Notes, recently described the Internet as "fundamentally broken" because of NAT and firewalls, which also violate end-to-end by blocking certain types of traffic on the grounds of security.

The lack of adoption of IPv6 is not really surprising. There is little incentive for anyone to switch to it. The use of NAT boxes offers a quick fix for the shortage of addresses. And while IPv6 offers a more elegant solution, if nobody else is using it, why bother to upgrade? The answer, of course, is that otherwise the Internet will suffer in the long term.

The switch to IPv6 is clearly vital if the Internet's current flowering of innovation is to continue. Perhaps the use of IPv6 in mobile devices—which are widely expected to outnumber machines connected to the Internet by fixed connections within a few years—will be the factor that encourages everyone else to switch. Another possibility, raised by Pete Loshin, a computer consultant and the author of "IPv6 Clearly Explained", is that IPv6 might spread in the form of a "disruptive technology". In other words, IPv6 might take off in a totally new application that the current incumbents in the networking business have not foreseen, rather than simply via upgrades of existing equipment. The vast number of addresses might make IPv6 an ideal way to do inventory control, for example, with an embedded wireless chip in every item in a supermarket, library or warehouse. When Mr Loshin mentioned this provocative idea at a conference on IPv6, where the discussion was narrowly focused on the question of which existing vendors in the computer industry were supporting IPv6, jaws dropped around the room.

AP



Vint Cerf, chief guru and architect of the Internet

But the fact remains that even if everyone switched to IPv6 overnight, the future of the end-to-end philosophy would still be under threat, because of the second of the two challenges identified by Dr Cerf: the growth of high-speed "broadband" connections, and the associated demands from users that such connections deliver a guaranteed level of service. At this point, the lofty engineering ideals behind end-to-end collide with the harsh realities of economics.

The problem with quality

In retrospect, it is perhaps surprising that the idea of treating all data packets equally survived the Internet's switch from being an academic to a commercial network. Visit a web server on the other side of the world, and the packets that travel between it and your computer will pass over the networks of perhaps a dozen different Internet service providers (ISPs), who have no direct business relationship with you. There was no need to negotiate the right to transfer data in advance. Instead, it all just worked, and the web article popped up on your screen. The ISPs realised that agreeing to carry traffic for each other's customers was in everyone's interests.

But the rise of broadband connections complicates this picture. There are a number of reasons why the providers of broadband connections might no longer find it in their interests to adhere to the end-to-end principle. These reasons were outlined recently by Lawrence Lessig of Stanford University and Mark Lemley of the University of California at Berkeley. For a start, many broadband providers offer special content, such as movies and music on demand, to their broadband subscribers. Since this content is the basis of their competitive advantage, providers have no incentive to supply rapid access to competing providers' content or networks, which is obviously contrary to the notion of end-to-end. And whereas providers of dial-up connectivity generally do not own the physical connections into their subscribers' homes (the telephone wires), providers of broadband connectivity generally do. They are thus in a position to place limits on the kinds of services that can be provided over their connections. Again, this poses a potential threat to the end-to-end concept.

But potentially most worrying is the idea of "quality of service" (QoS). With high-bandwidth connections, users expect high performance. Streaming audio and video, and Internet telephony, also require a guaranteed minimum level of performance (see article). There are, says Dr Cerf, two competing approaches to providing this: one is simply to make the whole network go faster, so that even the slowest links are acceptably fast; the other is to introduce new protocols that allow users to negotiate a connection with a guaranteed quality of service. (Dr Cerf admits that he oscillates between support for these two ways of doing things.) The first approach is obviously simpler and neater, and preserves end-to-end, but it overlooks the fact that ISPs are inclined to treat their own customers' traffic with a higher priority than that of their rivals' customers. So a number of protocols are under development to allow the negotiation of guaranteed-quality connections across the Internet. The question is: can such QoS protocols still be consistent with end-to-end?

Reuters

One research effort that is looking into this area is Internet2, a not-for-profit consortium that is a deliberate recreation of the partnership between American academia, industry and government that led to the development of the Internet in the first place. The idea is to develop new protocols and technologies,

initially for academic use, in the hope that they will filter into the mainstream, just as today's Internet technologies did. Guy Almes, Internet2's chief engineer, says that the key problem is implementing QoS at the boundaries between different network providers. How do different networks tell each other what level of service they can provide? One approach being pursued in the commercial arena is to provide different levels of service at different prices. But the logical extension of this approach is that accessing high-bandwidth content across multiple service providers' networks would require negotiation for each mouse click. At the moment, says Dr Almes, users can access sites on the other side of the world without having to negotiate in advance. "Preserving that in a QoS world is hard," he adds. The Internet2 researchers hope that it will be possible to devise ways to provide a guaranteed level of service for applications that require it—such as audio streaming or tele-operation—without having to get involved with the commercial implications. The hope is that it will be possible to find a middle way between today's "best effort" Internet (where no guarantees are made about QoS) and the scenario where high-speed connectivity is only guaranteed between customers of the same ISP.

Show me the money

But can those working on new QoS protocols really expect to be able to ignore the economics? Because one way to square the circle of providing QoS, while maintaining end-to-end, might be to do what has hitherto been regarded as unthinkable: to build a payment mechanism into the Internet's foundations.

This, at least, is the idea of Dave Clark of Massachusetts Institute of Technology. It was Dr Clark, along with two other MIT researchers, who popularised the term "end-to-end" in a paper published in 1981. When IPv6 was being designed, Dr Clark was among those who called for it to incorporate support for prioritisation of traffic and QoS. But, he says, Dr Deering resisted the idea because "it raises an ugly factor, which is payment". Historically, the Internet's protocol designers have, says Dr Clark, been rather proud of the way they have studiously ignored the economic realities of the Internet. He and others, including Dr Cerf, believe this position is no longer tenable.

In the grand scheme of things, says Dr Clark, even IPv6 is just a short-term fix. He is one of a handful of researchers who have just been granted research funds by the Pentagon's Defence Advanced Research Projects Agency (DARPA), the body that first fostered the development of the Internet, to look into the long-term architecture of the Internet. The resulting initiative, called the Newarch Project, is taking a completely clean-sheet approach to the design of the Internet over the next 25 years, based on the lessons learned over the past 25 years. (The team is studiously ignoring the question of how this network might get built, and how users might migrate to it from today's Internet.) Dr Clark's idea is that the only way to ensure the future of end-to-end is to build support for payment right into the Internet Protocol. This would acknowledge the fact that in some circumstances, the only way to get service providers to adhere to the end-to-end philosophy is to pay them to do so.

Admittedly, that approach will involve negotiation within the network, which is itself contrary to the spirit of end-to-end. But Dr Clark's point is that the alternative is worse. Religious adherence to the end-to-end principle by protocol designers is no good in a world where broadband providers can do as they please. Without a payment mechanism, end-to-end is doomed. "QoS is not being deployed today in an open, end-to-end way because we haven't developed a good economic model alongside the technical model," he says.

Already, Dr Clark's team at MIT is working on new protocols to enable automatic negotiation of terms of service for users of mobile devices communicating over the popular 802.11b wireless protocol. The idea, he says, is that as you walk down a street with your laptop, it negotiates with base stations in the area and decides whether to set up a connection based on the price constraints you have specified. Perhaps, he suggests, it will be possible to create a spot market in mom-and-pop connectivity by building payments into the connection protocol. It sounds alluring, though the idea of micropayments, which has been proposed many times before, has yet to take off.

Clearly, overhauling the Internet's architecture in a way that balances engineering and commercial concerns is a thorny problem, and one that even the Internet's most gifted wizards have so far been unable to solve. But nothing less than the Internet's ability to support and promote innovation is at

stake. The demise of the end-to-end principles that have served the Internet so well would be a tragedy: users might find themselves fenced off within “walled gardens” of content, and the emergence of hitherto unimagined new applications might be stifled. Were that to happen, the last decade of the 20th century might come to be seen as an all-too-brief golden age of openness and innovation that was fatally undermined by short-termism and greed. “What worries me more than anything is: are there business models that can ensure that the net can support itself?” says Dr Cerf. “If it can’t sustain itself, it will go away. And I don’t want it to go away, because it’s so much fun.”

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MONITOR

Virtual hype, real products

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From The Economist print edition

How to turn over-hyped virtual reality ideas that barely work outside the laboratory into commercial products for the real world

IN THE early 1990s, virtual reality (VR) catapulted into the headlines on the back of hope and hype. Head-mounted 3D displays would soon become as common as mobile phones. But with the exception of a few high-end applications in medicine (see article), the reality part of VR has been disappointing. One of the biggest problems has been getting the equipment out of the hands of engineers in the laboratory and into the hands of real users.

To coax this process along, a company called 3rdTech set up shop last year in Chapel Hill, close to where one of the leading VR groups in America is based at the University of North Carolina. Acting as a sort of "smart incubator", 3rdTech has been trying to get various VR technologies to the stage where investors and entrepreneurs are ready to take the plunge.

Fortunately, the founders of 3rdTech, Nick England and Doug Schiff, have plenty of experience of starting companies, and also enough technical know-how (one is an electronics engineer, the other a computer scientist) to understand the intricacies of the technologies involved. More to the point, both have the advantage of not having worked in VR research and belonged to one particular intellectual camp or another. As a result, they have drawn customers from varied quarters.

The DeltaSphere is a case in point. This consists of a spinning mirror which scans a laser beam back and forth over a whole room. A detector measures the distance the beam travels to and from each point it hits. The result is a digital 3D map of all the surfaces that the laser passes over. The original idea behind this device was as a tool for generating realistic 3D images for use in VR headsets. But 3rdTech found that the device was also useful for an engineer needing to document a large structure, such as part of an oil rig, which had been modified many times without the original drawings being updated. This way, the engineer can ensure remotely that further modifications are compatible with the existing structure.

Another product, called HiBall, is a tracking device that was developed so that a computer could follow the exact position and orientation of the head of a person wearing a head-mounted display, in order to generate a 3D image that follows the head motion accurately. The device uses infra-red signals from an array of diodes mounted on the ceiling to triangulate the exact position and orientation of a small optical sensor—much as global positioning satellites help motorists find their way.

The company has found customers interested in using the device to trace the position of tools being used to repair large structures such as aircraft fuselages. This way, the mechanic using the tool can ensure that the repairs match computer-generated plans. Tracking robot arms on assembly lines is another possible application. In both cases, the large scale involved means that existing techniques that use mechanical booms are often expensive and impractical.

One 3rdTech product will please the VR purist, though. A device called the NanoManipulator allows scientists to manipulate microscopic objects—and even molecules—by "feeling" the surface of the object using a special pen that exerts a force when its tip contacts a surface. Even here, the company has shown commercial acumen by adapting an off-the-shelf force-feedback pen developed by SensAble Technologies of Boston, rather than trying to develop the hardware from scratch.

Cramped in small offices above a perfume shop, 3rdTech has foregone the usual high-tech facilities in the region's famed Research Triangle so as to be closer to the university's VR experts. On the campus across the street is Fred Brooks, one of the grandfathers of VR (he has been working in the field since the 1960s). Today, Dr Brooks views VR as having "gone from almost working to barely working". Firms such as 3rdTech are helping to show that such an over-hyped and "barely working" technology can indeed be turned into commercial products for the real world.

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The people v America Inc

Mar 22nd 2001 | NEW YORK
From The Economist print edition

Along with creditors and shareholders, a third group is developing significant ownership claims on American companies: litigants

THE manufacturer of Bubble Wrap ought to be as well protected from a financial collision as any product wrapped in the firm's ubiquitous plastic would be from a more normal crunch. Sealed Air Corporation's margins and growth prospects are good, its patent protection strong. Three years ago, however, it made what in retrospect can be seen as a classic American blunder: it thought it was merely acquiring another plastic-packaging company; instead, it was buying a legal nightmare.

The problem was the seller, W.R. Grace, a conglomerate that now teeters on the edge of bankruptcy from asbestos litigation. Lawyers pursuing Grace reckoned Sealed Air's profits could be theirs if a court could be convinced that along with the acquisition of any Grace subsidiary came Grace's full liabilities—despite the fact that the firm bought by Sealed Air had never been involved with asbestos. When word of the litigation spread, Sealed Air's shares and bonds were both hit hard. Regardless of the outcome of the case, Sealed Air is paying a higher cost for lawyers, and a higher cost for capital.

And it is not alone. Last year, Moody's, a credit-rating agency, downgraded 22 American companies at least in part because of litigation risk. Asbestos lawsuits were responsible for several of these, but even without asbestos, last year would have been a record. Sotheby's, an auction house, and UST, a chewing-tobacco firm, saw their credit downgraded in connection with antitrust violations; Beverly Enterprises was hit for violating America's complex Medicare billing practices; and American Home Products was downgraded following a $12.3 billion settlement stemming from its production of a diet drug that cleared federal safety hurdles but was later found to be dangerous. To an indeterminate degree, the threat of lawsuits could be driving the widening of spreads between corporate and government bonds, says John Puchalla, a Moody's economist.

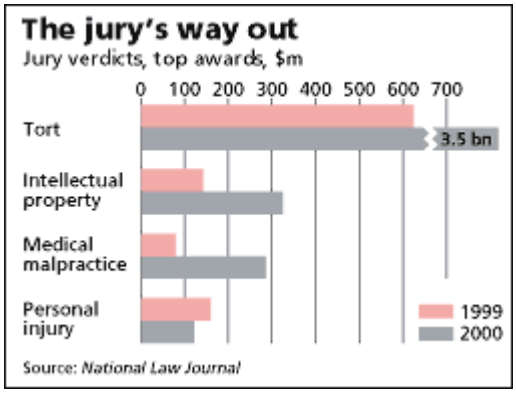
Of the many ways in which companies can end up owing vast sums of money in litigation, six currently stand out. Product-liability cases are the single most common area, followed (in no particular order) by suits concerning antitrust, intellectual property, employee conduct, contractual failure and, increasingly, shareholder actions. There is nothing new about the categories themselves; what has changed is that each has become, in essence, a huge industry in itself, fed by ever larger settlements.

One indication of this boom is a jump in the price of general liability insurance—the commonest corporate policy—by 8-10% over the past year, says Robert Hartwig, chief economist at the Insurance Information Institute, a trade group. A survey by Jury Verdict Research, a group used by many law firms, found another sign of the boom: the median product-liability award against businesses rose by 44% between 1998 and 1999, from almost $1.3m to more than $1.8m. Consistent with this, the *National Law Journal* reports that awards in excess of $100m are on the rise, from 18 in 1999 to 27 in 2000.

Some industries are being severely affected by these costs. Huge verdicts against nursing homes in Florida for mistreating patients, for instance, have had the perverse effect of pushing the cost of insuring each bed to almost $13,000, a price that puts homes out of reach of those who cannot afford to receive care in their own home, says Maurice Greenberg, chief executive of AIG, an insurer.

Some companies sit on legal black holes of almost unimaginable size. Buried in the footnotes of Exxon Mobil's latest financial statement, for example, are details of a $5.1 billion award, handed down in 1996, for the environmental damage caused by the Exxon Valdez oil tanker. If this is upheld, Exxon will also owe accrued interest in the hundreds of millions. This year Exxon was

also hit with a $500m verdict for mispricing petrol sold to service stations, and another $3.5 billion verdict for underpaying for drilling rights in Alabama. These, too, are on appeal.



Because litigation risk is difficult to analyse, when the financial markets do wake up to these concerns they often panic. As a result, the indirect costs from higher financing charges can become as important as any potential verdict or settlement. Take the case of Crown Cork & Seal, which late last year disclosed a rise in asbestos claims related to a firm it owned for three months in 1963. A liquidity crisis ensued: costs on refinancing its $2.5 billion in short-term debt rose by two to three percentage points, with each point adding as much as $25m in annual expenses.

No company is wealthy enough to shrug off litigation. In 1994, Dow Corning, a chemical company jointly owned by Dow Chemical and Corning, had an AA bond rating and financed its operations at negligible cost through the public debt markets and from a global network of eager banks. In 1995, it filed for bankruptcy under the weight of lawsuits related to breast implants, a product that has never been proven unsafe (though it can leak). Six years later, the firm remains mired in bankruptcy thanks to successive rounds of litigation on new grounds, notwithstanding its payment of billions of dollars in claims to cover every implant that it had a role in producing. In all this time, Dow Corning has been locked out of the public debt markets and deserted by most of its banks.

Stockmarkets, like debt markets, can also react jumpily when a company is hit with a lawsuit. In a rare effort to gauge the impact of litigation on listed companies' shares, Jonathan Karpoff of the University of Washington, and John Lott Jr of Yale Law School, published a paper in 1998. This concluded that announcements of lawsuits seeking punitive damages caused losses in market capitalisation that, on average, exceeded the eventual settlement. The authors attributed this to lawyers' fees and lasting damage to corporate reputations.

Often, litigation is not the trigger for a company's share-price decline, but rather the result. This is because any company whose share price falls sharply is exposed to legal action, either through a "shareholder class action" charging general managerial incompetence, or a "shareholder derivative suit" accusing the board of not providing adequate information. Lawyers say these suits prompt much-needed change. But it is questionable whether they make economic sense, as they typically end up taking money from firms (ie, shareholders) and returning it to them minus lawyers' fees—which can be one-third of the settlement.

However, this has not stopped shareholder suits from becoming a huge issue. Premiums on insurance that protects managers from these suits has risen by as much as 40% this year. Not long ago, settlements over $25m were rare; now, that is the average. Cendant, a hotel and car-rental company, is finalising a settlement for a shareholder suit stemming from a merger with CUC, a rival whose accounts were fraudulent. The final pay-out is expected to approach $3 billion.

Ironically, a strong share price can cause problems too. An ongoing discrimination suit against Microsoft, brought by black employees, accuses the company of giving white employees more favourable stock-option packages several years ago. The plaintiffs are claiming the difference between the current value of their options and the value of those held by white colleagues. If the $5 billion suit is successful, every technology company with high-flying shares and a low percentage of minority employees will become vulnerable.

Regulation through litigation

On the face of it, why shouldn't a company that does something wrong pay the price? This sense of justice, after all, is why Americans love the novels of John Grisham and movies such as "Erin Brockovich", with Julia Roberts. It is tempting to argue that litigation is good because it replaces direct government regulation. Moreover, there is something to be said for the entrepreneurship of the plaintiff bar. Regulatory agencies often ossify, whereas plaintiff lawyers quickly gravitate to problems. The trouble is, there is no incentive for a plaintiff lawyer, or a jury, to weigh up the broader implication of huge awards against companies, especially multi-million-dollar punitive damages.

Might the burden on companies ease now that George Bush is in the White House? While governor of

Texas, Mr Bush championed reforms that would make cases harder to bring: larger class actions would be more likely to be heard in federal courts, limiting jurisdiction shopping; lawyers bringing frivolous suits would face fines; and lawyers' fees could be more easily challenged.

Whether any of these are enacted, however, remains an open question. The plaintiff bar is flush with cash from tobacco and asbestos settlements, and willing to reinvest profits not only in new litigation but also in political contributions. So far, the Democratic Party has been the main beneficiary of this largesse. Hillary Clinton's Senate campaign, for example, received 200 donations from plaintiff-related sources, according to the American Tort Reform Foundation.

The connections are not limited to the Democrats, however. The brother-in-law of the Republican Senate majority leader, Trent Lott, is Richard (Dickie) Scruggs. His law firm has received more than $1 billion in tobacco settlement money and is heading litigation against the six largest health-management organisations (HMOs). Any settlement could conceivably allow Mr Scruggs's firm to retain a percentage of America's health-care expenditures that would make the tobacco settlement look small.

Pushing for reform would no doubt be easier if there were more precise information on the cost of litigation. Remarkably, for an issue so intimately tied to public policy, the information ranges from poor to outright wrong, says Deborah Hensler, a professor at Stanford Law School. State courts often provide no data, while data provided by federal courts can be misleading. Most litigation is threatened and settled, leaving no financial trace. With more effort, these costs could be captured. Federal agencies routinely collect data from companies on employee benefits and pension plans for statistical surveys, notes Ms Hensler. The same methodology could be used to compile litigation pay-outs.

Reacting to a sense that verdicts have got out of hand, the Supreme Court on February 26th heard appeals against two large awards: one a $4.5m copyright-infringement verdict over the design of a pocket tool; the other a $1.2 billion product-liability verdict against General Motors following a car crash. This is not the first time that the court has tried to send such a signal, however: in 1998, it threw back a multi-million-dollar verdict triggered by a touch-up job at a car dealer that was estimated to be worth $4,000 in compensation. Penalties, the court ruled, must be tied more closely to harm. It is not yet clear that anyone is listening.

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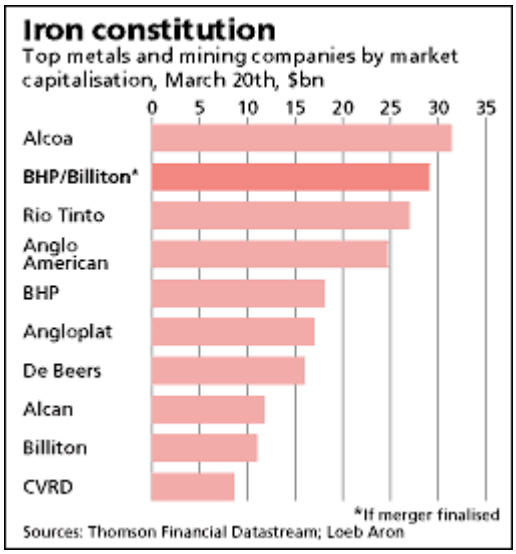
Mining

Bigger digger

Mar 22nd 2001
From The Economist print edition

JUST two years ago, the mining firm known as “Big Australian” was bleeding red ink. It turned to a big American with big ideas for help. The burly new boss whipped it into shape, and within a year profits were soaring. Now, the motorcycle-riding executive plans to gobble up a biggish British rival. Having transformed BHP, can Paul Anderson secure it a place in the big league?

His latest move is characteristically bold, but it may yet produce a few nasty surprises. On March 19th, Mr Anderson revealed plans to merge BHP with Billiton, a British mining firm formerly based in South Africa. If consummated, the deal would create a giant with a market capitalisation of almost $30 billion and annual sales of nearly $20 billion. BHP shareholders will control about 60% of the combined group; the offer implies a premium of around 20% for Billiton’s shares. Mr Anderson will serve as chief executive until the end of 2002, when he is to hand over to Brian Gilbertson, Billiton’s current boss.



This putative deal is but the latest in a frenzy of consolidation that has gripped the global mining and metals industry in recent years. In 1999, North America saw a wave of mergers in copper and aluminium, including a hostile bid for Reynolds by Alcoa, the world’s biggest metals firm. London-based firms led the charge last year, with forays by Billiton, and by Rio Tinto and Anglo American, its much-bigger compatriots. Earlier this year, Anglo launched a bid that would take the De Beers diamond cartel private.

One reason why size matters is the mining industry’s small size relative to other comparable industries, such as petroleum. This means that only the biggest firms catch the eye of big institutional investors. Another reason is that size and profitability are often linked. One reason, argues Ian Maxwell of Schroder Salomon Smith Barney, an investment bank, is that only the biggest firms can afford to get over the high barriers to entry in the high-return, low-risk niches of the mining business: iron ore, alumina, diamonds and industrial minerals. As it happens, BHP is strong in two of these areas, and Billiton in the other two.

Still, snags may yet emerge. The deal might attract scrutiny from antitrust authorities. Competition concerns have already scuppered one big deal in the industry: the three-way aluminium merger proposed by Alcan, Pechiney and Algroup in 1999. But analysts say this is less likely to be a problem for BHP and Billiton since there is little overlap: Billiton brings exposure to southern Africa and strength in aluminium and copper, while BHP adds Australian assets and strength in coal, oil and other minerals.

A likelier problem may be a hostile bid for Billiton, which could be a good fit for either Anglo American or Rio Tinto. Anglo already owns 7% of Billiton, but it has its hands full with its ongoing De Beers deal. Tilting at Billiton now would also be financially risky for Anglo, especially given the promises by its boss, Tony Trahar, to show financial discipline and to diversify the firm away from its South African roots. Another bidder could be Alcan, which is rumoured to have been in merger talks with Billiton before BHP clinched the deal. However, any new suitor must be ready to top the hefty premium offered by BHP.

Even if a rival bid does not snatch Billiton from BHP’s clasp, Mr Anderson is not guaranteed success. After all, most mergers in most industries fail to live up to their promise. In this case, however, cost reductions through layoffs or asset disposals are not the main justification; the firms promise to squeeze out less than $300m in costs by 2003.

This may not be as bad as it seems. The synergies on offer are so meagre only because the two firms are unusually complementary. Mr Anderson says that the deal is not about cost savings, but rather about

“creating opportunities” (what deal isn’t?). The merged firm’s bosses have already declared that it will pursue yet more deals.

Jack Jones of CIBC, an investment bank, argues that the mining business is now divided between vultures and victims—and that this merger will move both companies firmly into the former camp. The deal, he says, should revive the finances of Billiton (whose large debt overhang made it the worst-performing British mining share last year) while leaving an enlarged BHP’s balance sheet healthy.

Even so, sceptics still worry that the firm may not be able to establish a new corporate culture quickly. Some point to the dual-listing structure of the deal (akin to that of the Anglo-Dutch Unilever) and the “heir apparent” arrangement, with Mr Gilbertson hanging about for the boss to retire.

Mr Anderson dismisses such suggestions. He insists that he is fully aware of the need for speedy integration, and points out that he is a veteran of two other successful mergers, one of which produced Duke Energy, one of America’s biggest electricity firms. Still, he will need to move quickly if he wants to leave with his reputation intact. As he himself points out: “I’ve learnt with mergers that no matter how fast you move, you didn’t move fast enough.” Those words may yet come back to haunt him.

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Hollywood

Lights, camera, whoops...

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From The Economist print edition

HOLLYWOOD is in its most self-congratulatory mood at Oscar time. But after the awards have been handed out on March 25th and the champagne corks have stopped popping, Tinseltown has to roll up its sleeves quickly and get back to business. A series of strikes threatened by writers and actors could shut most of the movie-making industry down.

The writers threaten to switch off their laptops on May 1st, and the actors say they will walk off sets two months later, on June 30th. It could be a long and bitter battle: new contracts are at stake. Their negotiation always involves a certain amount of posturing, including talk of strikes, but this year it looks to be more serious than usual. This is partly because the Screen Actors Guild (SAG) held a six-month-long strike last year—the longest in Hollywood's history—following the expiration of the contract for actors appearing in commercials.

Negotiations between the Writers Guild of America and the Alliance of Motion Picture and Television Producers, which represents studio managers, broke off on March 1st with both sides far apart. Among other things, the writers have been calling for more "creative rights", such as how much of a say they should have in the making of a movie and the sort of credits they should get. Despite many directors dreading the prospect of writers tramping around their film sets, discussions about these issues have made progress. But the sticking point, as ever in Hollywood, is money.

Like the actors involved in the strike last year, the writers want higher "residual payments". Every time a film or programme is released on television, video or DVD, a payment is due to the writers involved. The writers claim these payments should be higher because repeat showings and alternative forms of distribution—including, eventually, the Internet—are becoming an increasingly important source of revenue for the studios. Negotiation of the contract for actors will also hinge on residual payments.

If media conglomerates such as AOL Time Warner, Disney and Vivendi Universal are going to suffer a strike, they may use the opportunity to clear out dead wood within their own organisations. This could antagonise things further and make the effects of a strike even worse for the many small businesses that depend on the entertainment industry, from caterers and carpenters to make-up artists and dry-cleaners. The pain would be felt across Los Angeles. Jack Kyser, the chief economist at the Los Angeles County Economic Development Corporation, estimates that Hollywood contributed $31 billion to the region's economy last year, and that a six-month strike would slow down growth in the area's employment.

The effects could last far longer than any strike. Many supporting trades in Hollywood are worried about growing competition from film industries in other countries, such as Australia, Britain and Canada, where they have been nourished with tax breaks or other subsidies. On top of that, the relatively high value of the dollar means that shooting a film is often cheaper abroad for an American production company than it is at home. In January, America's commerce department estimated that film production shifting abroad is already costing the country $10 billion a year. In 1998, some 139 of the 308 movies made for American television were shot outside America, compared with just 30 produced abroad in 1990.

Although American actors and writers are unlikely to risk being blackballed by travelling abroad to work on overseas productions during a strike, other trades would be free to do so. If a strike did drag on, the only Oscar to be awarded in 2002 could be for "Best Foreign Film".

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Face value

Radicalism, Asian-style

Mar 22nd 2001
From The Economist print edition

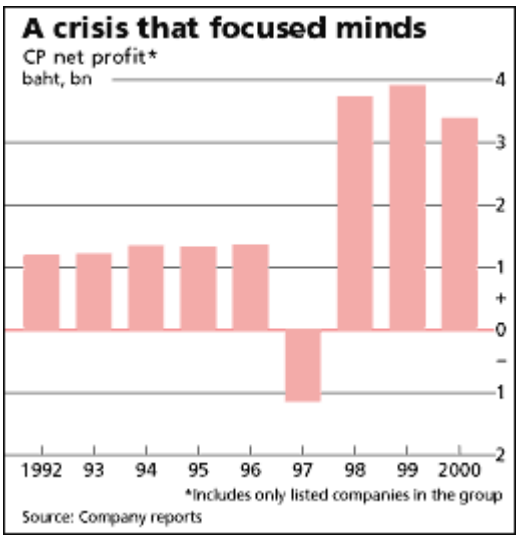
Dhanin Chearavanont is one of South-East Asia's leading tycoons and one of the most eager to restructure. Can he untangle his business from his family?

IN ORDER to grasp just how much Dhanin Chearavanont, the patriarch of Thailand's largest corporate empire, stands out from South-East Asia's business culture, first consider how much he once personified it. The son of immigrants from southern China, he built the family business from humble beginnings to towering heights. He mastered the winks and nods of the overseas Chinese networks, then kept outside investors in the dark. He expanded recklessly into totally unrelated industries.

By 1997, Charoen Pokphand (CP), the empire that Mr Dhanin runs, was a typical Asian family business. It sprawled. CP's "core" business, if it had one, was the production of food—it is, for instance, the world's largest producer of animal feed and tiger prawns. But CP was also dabbling in telecoms, insurance, retailing, pharmaceuticals, petrochemicals, breweries and even motorcycles.

All this had to be financed, and here too CP was typical. Part of the group was privately held by the family and totally opaque; other parts were publicly listed. Investors would put their money into the listed part, but had virtually no way of tracing what happened to it thereafter. All of this was, and still is, so commonplace in much of Asia that it would hardly be noteworthy, except for what has been happening lately.

For most of Asia's tycoons, the economic crisis of 1997-98 was traumatising, but a wake-up call it was not. Mr Dhanin, by contrast, sat down with his brothers for some honest reassessment. His conclusion—which, in South-East Asia, borders on radical—was that CP should slim its activities. So Mr Dhanin started turning down "offers" to expand (into power plants, motorways and airports, for instance) and even began selling things (supermarkets, a brewery, the motorcycle maker and more). He also vowed that CP would try harder to please outside shareholders by striving to become more open.



If raising these subjects at the family—ie, boardroom—table suggests an unusually open mind, then this is not so out of character. Mr Dhanin has always blended typically Asian ways of thinking with his own idiosyncrasies. He loves cock-fighting, but insists on making the sport more humane by putting little boxing gloves on the sparring roosters, in place of the customary blades. He breeds pigeons and gets rather competitive about racing them, but he never orders pigeon in a restaurant.

In business as well as sport, Mr Dhanin ploughs his own furrow. He swears by Feng Shui, and has been known to consult face readers before hiring executives. He also displays a flexible attitude to patriotism. At home, the family speak their ancestral dialect, and there are those who claim that Mr Dhanin's Mandarin sounds better than his Chinese-accented Thai. He has certainly never tried to hide his roots: he was the first outside investor in China when Deng Xiaoping re-opened the country in 1978, and he is one of the biggest and best-connected investors there today. Yet he is also a proud Thai, adorning office walls with portraits of the royal family, and showing off the pin on his lapel, which was put there by the king himself in recognition of his good deeds. Mr Dhanin is also close to many Thai politicians, not least the current prime minister, who happens to be an ethnic Chinese telecoms tycoon.

For all his connections, Mr Dhanin, 61, is humble enough to realise that he must forever keep learning and changing. So he and his brothers, who are in their seventies, have agreed on a management motto: “Every year we get a year older, but let’s make sure that our brains get a year younger.” Whether the subject is the latest food-production technology, shifts in health consciousness among consumers, or new management fads touted by globe-trotting consultants, Mr Dhanin claims to listen. It is this attitude that has helped CP win accolades as one of the best-run conglomerates in Asia.

Not quite in focus

Nonetheless, this is still Asia, so there are limits to the pace of change. Take, for instance, Mr Dhanin’s two favourite words these days: “focus” and “transparency”. For hard-nosed executives in western countries, being “focused” is like being pregnant—you either are or you aren’t—but Mr Dhanin seems to think that being half-focused will do. Here, family considerations play a part. Even without synergies, he says, telecoms in Thailand looks like a great opportunity, as does retailing in China. So one son runs the former, another the latter, and this won’t change. The same ambivalence applies to transparency. Mr Dhanin talks more to investors and the press than he used to, and discloses more about his listed companies. But large parts of the empire remain in a cloud. Eventually, he says, all of it should come under a public holding company. When? He gives no timetable.

Still, behind the changes at CP lurks a bold vision. Mr Dhanin and his brothers were raised on Confucius, so they would never put the company above the family. At the same time, he recognises that the company has outgrown the family (it needs more outside capital) just as, in another way, the family has outgrown the company (there are too many relatives for all to be managers). In the long run, Mr Dhanin reckons, the only way to keep peace in the family is therefore to make all its members shareholders in a transparent company. Then none of them has special advantages when buying or selling shares.

To Mr Dhanin, who is a Buddhist, there is an even deeper thought here. He believes companies are like living beings: they follow a cycle of birth, growth, decay and death. “We cannot keep the business in the family forever,” he says, smiling. “So if you know that, why not prepare?”

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Software

Digital baroque

Mar 22nd 2001
From The Economist print edition

COMING soon to a screen near you: a revamp for your computer's operating system. Microsoft's new Windows XP, announced in February, will come as standard on almost all new PCs by the second half of the year. Yet although it has 92% of the market, according to figures from IDC, a market-research firm, Windows does not quite rule the desktop. On March 24th, Apple launches the latest version of its operating system for Macintosh computers, Mac OS X (pronounced "oh-ess-ten"), which it hopes will boost the Mac's market share above its current measly 4%. Mac OS X has more than just an "X" in common with Windows XP. The two launches represent the culmination of lengthy and horribly overdue efforts by Microsoft and Apple to modernise their operating systems.

For years, Microsoft has developed and sold two separate versions of Windows: one for home use (the most recent incarnation of which is Windows ME) and a more high-powered and reliable version for businesses (most recently, Windows 2000). The home version of Windows has always been far more crash-prone, but supports a wider range of software—in particular, it lets you play more games. Maintaining two versions of Windows is, however, hugely costly for Microsoft, and the company has been trying to combine the best features of both for many years. With Windows XP, it has finally done it. Even so, XP will be sold in different guises for home and office use, and Microsoft is initially pushing it in the home market, since it does not want to undermine corporate sales of Windows 2000 just yet. To this end, it has added new features to simplify the use of digital cameras, music files and video clips.

Similarly, Apple has toiled for years to give the Mac OS grown-up features such as protected memory (which means fewer crashes) and multi-tasking (which makes it possible to run lots of programs at once smoothly). After many false starts and changes of plan, Mac OS X marks the realisation of this dream. In fact, it is really a new operating system altogether, incorporating a clever piece of software that makes it compatible with old programs. Apple has also overhauled the "look and feel" of its operating system, with widespread use of shadow, translucent and liquid effects. And, like Microsoft, it has recently been pushing the PC as the hub of a "digital lifestyle" by including extra software for editing videos and "burning" CDs. But, somewhat embarrassingly for Apple, it turns out that Mac OS X will not support DVD playback or CD burning until the summer.

Both firms hope that their new operating systems will boost sales of new computers, and breathe some life into the ailing PC industry. XP and OS X both require powerful machines, so that it may make more sense to buy a new computer than to try and upgrade an old one. Besides, upgrading is painful: getting existing hardware and software to work with a new operating system is never easy.

This is what makes another new desktop system, released on March 19th, so interesting. Nautilus is a snazzy graphical desktop environment for Linux, the free operating system developed by programmers collaborating over the Internet. Eazel, the Silicon Valley firm behind the software, hopes to make Linux easier to use than the Mac OS or Windows, and thus to boost Linux's share of the desktop market above its current 1%. Eazel is giving away Nautilus, but hopes to make money by charging users for services such as online storage, regular backups and—cleverest of all—automated software upgrades.

The idea is that when an update to a particular piece of software becomes available, Nautilus allows the user to download and install it with a single click. Security and bug fixes are thus installed quickly, and each upgrade is small and painless. This is a radically different approach to most software updates, which aggregate lots of fixes into infrequent, large and painful upgrades.

Windows XP and Mac OS X are, in comparison, the software equivalents of baroque cathedrals: vast, complicated edifices built by thousands of workers over many years. But though its approach may be more elegant, Eazel must show that its business model, as well as its technology, will work. That will not be easy. Many software firms that are trying to make money from Linux are struggling, and Eazel recently announced layoffs of its own. It insists that with the collaboration of Linux's vast community of programmers, it can punch above its weight. But the cathedrals are not quite ready to crumble.

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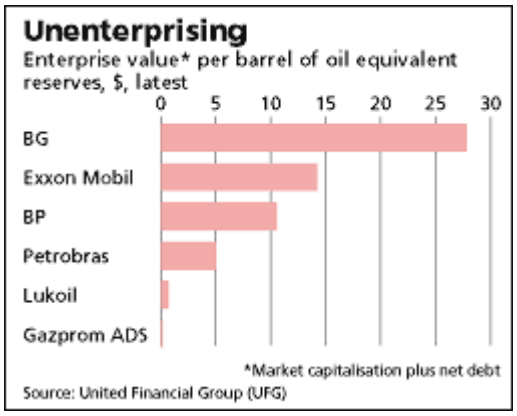
Russian energy

Gassing on at Gazprom

Mar 22nd 2001 | MOSCOW
From The Economist print edition

ANOTHER board meeting, feeble excuses, mysterious threats and murk aplenty—business seems to be pretty much as usual at Gazprom, Russia's biggest company. Minority shareholders wish it were otherwise. Their biggest beef is with Itera, a Florida-based outfit that has become one of the world's largest private-sector gas companies thanks to its unexplained, and evidently advantageous, ties with Gazprom.

Led by Boris Fedorov, a combative former finance minister and a Gazprom outside director, the minority shareholders have commissioned Deloitte Touche, an accountancy firm, to investigate Gazprom's links with Itera. At a stormy board meeting on March 20th, Gazprom's bosses repeated their line that the existing auditors, PricewaterhouseCoopers (PwC), should do the job.



After weeks of havering, PwC is now set to agree to this. Angry investors have got hold of compromising documents on Gazprom's relationship with Itera. One was leaked to the *Financial Times* last week. More may follow. Investors are curious as to why PwC has never mentioned Itera as a related party in its audits of Gazprom, and some of them are thinking of suing PwC, which vehemently denies any suggestion that it failed to do its job properly.

Now Mr Fedorov himself is under fire. There are threats of legal action from lawyers acting for unnamed foreign shareholders who claim that his campaign is driving down the share price. He says that he has received warnings of impending criminal proceedings in Russia. Unpleasant articles about him have suddenly started appearing in the Russian press. And last month, someone threw poisoned meat into his garden, killing his dog. "The threats are getting very nasty," he says.

Mr Fedorov's weakest point is a potential conflict of interest. The bank he founded, UFG, is a big dealer in Gazprom stock, especially helping offshore investors to buy shares listed in Moscow. In theory, these shares are only to be bought by locals. They trade at half the price of Gazprom shares listed in New York, known as American Depositary Shares (ADS).

Someone—many suspect Gazprom—is encouraging a London-based financier called Simon Cawkwell (nicknamed Evil Knievel for his daredevil tactics) to sue Mr Fedorov's bank. Mr Cawkwell says that by helping foreigners to buy local shares, UFG is hurting the price of those listed abroad.

Thanks to support from the government, Gazprom's largest shareholder, Mr Fedorov was able to beat back criticism from Gazprom management at this week's board meeting. He argues that Gazprom itself plays the same game: it recently transferred 1.4% of its locally registered shares to unknown foreign owners. That handed somebody an instant profit of around $100m, according to Stephen O'Sullivan, an analyst at UFG.

The Russian government talks about reform, but it has yet to show that corporate governance in big companies is much of a priority. The big test of its intent will come on May 31st when the contract of Gazprom's current boss, Rem Vyakhirev, expires. He wants another one, but that will require backing from board members who represent the government. If they plump for a more investor-friendly candidate, it will be an important step towards reform—such as plugging the $4 billion-plus that minority shareholders claim leak out of the company every year.

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Fibre optics

Drowning in glass

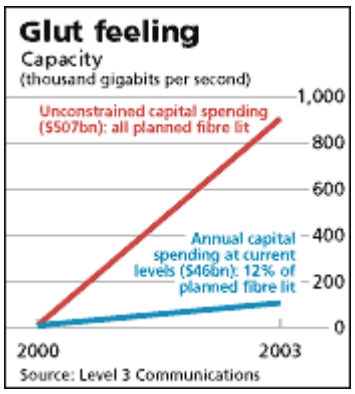
Mar 22nd 2001 | NEW YORK
From The Economist print edition

Can you have too much of a good thing? The history of technology says not, but that was before the fibre-optic bubble

DREAMY it may seem, but “build it and they will come” is one of the most fundamental and lasting laws of technology. Each year the labs of Silicon Valley find ways to increase the capacity of everything, from processors to storage space, seemingly beyond all sense and reasonable demand. Yet somehow ways are always found to use it all. In technology, capacity drives demand, rather than the other way round.

The same has been true for communications capacity, which has been growing quickest of all, thanks to fibre optics. But here, the recent stockmarket bubble changed the picture. Investors threw tens of billions of dollars at new telecoms companies that were laying fibre networks in competition with the incumbents. The pace of new fibre laying, already fast, became frenetic: sales growth at leading fibre makers such as Corning hit 50% last year, nearly three times the previous rate. The race to lay new fibre reached such extremes that one company, 360networks, rose to fame not for its network technology but because it invented a railway cable-laying machine that could rise up to let trains pass underneath, saving it from having to waste valuable time scooting off to a siding.

When the stockmarket tumbled, the industry realised that it was looking at an unprecedented overhang of raw fibre. As expensive as it is to lay fibre, it is far more expensive to “light” it with lasers, amplifiers and other optical equipment, and thus turn potential capacity into usable bandwidth. To light the new fibre that American carriers have already announced they are adding to their networks would cost more than $500 billion over the next three years, more than ten times current spending rates, according to Level 3 Communications, a carrier (see chart). Needless to say, that sort of money is no longer available.



Telecoms carriers tend to lay fibre speculatively, but only light it when they have an actual buyer. Now, with the stockmarket in a spin, they do not have as many of those as they were counting on. On March 19th, Corning warned that the growth of its fibre sales this year would be less than half last year’s level—and even that will be propped up by a huge backlog of orders from last year, which it will now be able to fill. Over the past six months, concern that the white-hot optics industry was going to slow dramatically has savaged the share prices of its leaders, leaving stars such as JDS Uniphase more than 80% off their peaks.

There is plenty of evidence to support the fear of a fibre glut. Technologies that were expected to consume huge amounts of capacity have been slow to arrive. Fast mobile-data networks using so-called 3G technologies will be delayed for years, a victim of disappointment with the present technologies and a drying-up of the capital markets. Gigabit Ethernet, which allows companies to connect their office networks at blazing speeds, has been held back by slowing corporate technology investment. And Napster, which accounted for an estimated 4% of total Internet traffic at its peak (and much of the demand for home DSL and cable modem connections), now risks being shut down.

Many of the companies that were expected to be the main consumers of new fibre have also been hit by the market downturn. So-called competitive local-exchange carriers, such as ICG, which build fibre networks in cities to compete with big incumbents, are sagging under heavy debt loads; ICG itself is under bankruptcy protection. Most of the upstart firms that planned to offer high-speed DSL connections to homes and small businesses, such as Covad, are also now on the ropes. All carriers have been hurt by the over-investment of the past few years, which brought more competitors to the market than demand could bear.

One consequence of all this is a gap between the main supply of potential bandwidth capacity (the long-haul networks between cities) and the main sources of new demand (small businesses and homes). From

now on, there will be fewer companies connecting these consumers to networks than before, and at slower rates. This “last mile” bottleneck keeps millions of homes and businesses using dial-up modems, consuming trickles of bandwidth when they might want floods, and leaves much of the fibre in long-haul networks unused.

But there is a big difference between a temporary mismatch in supply and demand and a rejection of the “build it and they will come” rule of technology consumption. The industry clearly overshot in the heady days when money was easy and growth was everything. Yet hardly anybody doubts that almost all the fibre in the ground today will be used eventually. The question is whether the companies that made the investment will be able to stay in business long enough to see the day.

Even in the current slump, Internet and other data traffic continues to more than double each year. Sadly, fibre investments in recent years implied a belief in even higher growth than that. Along with the growth in fibre itself, the optical-equipment industry was developing new gear that could send many more wavelengths down each fibre strand, multiplying the capacity of even existing cables a hundredfold or more. All told, carriers in the United States planned to increase their capacity almost seventyfold over the next three years, according to Level 3. At current rates of growth, demand would have only risen about fourfold over the same period.

But here, price elasticity may help the industry’s plight. One of the good things about the fibre glut is that the price of unused fibre, which had remained relatively stable (since it reflects the cost of construction workers more than technology), is now falling quickly. As more companies get in trouble and are forced to dump capacity, the price will fall even faster. The result may be that once the shakeout is over, the survivors will be able to offer unprecedented amounts of bandwidth for unheard-of prices. Companies such as Narad Networks are developing technology that will allow them to offer homes up to 100 megabits of raw bandwidth at less than $100 a month.

With that kind of capacity, applications such as video-on-demand suddenly become economically attractive. If people start watching TV over the Internet, the fibre now in the ground may no longer be enough. And so the cycle will start again, just as it does in Intel’s chips and Seagate’s hard drives. The only difference is that billions of dollars of investment will have been burned up waiting for that day. Fibre is not so different from other technologies, except for the cost of getting it wrong.

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Sorted

Mar 22nd 2001
From The Economist print edition

IT'S official: Deutsche Post, Germany's postal operator, is an abusive monopolist guilty of predatory pricing and anti-competitive practices. On March 20th, competition officials in the European Commission (EC) enjoyed a rare moment of satisfaction when their boss, Mario Monti, announced the findings of a lengthy inquiry into the group's business practices. On top of being forced to pay a *euro*24m ($21.6m) fine, Deutsche Post has agreed to split its operations, creating a separate entity to run its business-parcel services and ring-fencing this operation from its monopoly in letters.

The decision is a victory for UPS, an American parcels and logistics group. It complained to Brussels about Deutsche Post as long ago as 1994 and has lobbied persistently for a result. It also called attention to the German operator's rapid recent expansion into international logistics via acquisitions, arguing that deals were being unfairly subsidised by monopoly profits on domestic letters.

That charge, though beyond the scope of the EC inquiry, now looks better founded. UPS has recently attacked Deutsche Post in America, calling on the Department of Transport there to suspend the flying licence of DHL Worldwide Express, a logistics group controlled by the Germans. After this week's findings, UPS renewed these calls.

Deutsche Post tried to put a positive spin on Mr Monti's announcement, saying that it welcomed the end of the inquiry and that its new structure will make it more efficient. The truth is that the episode is hugely embarrassing and potentially costly. When the German government floated 25% of the group's shares last November, investors were reassured that questions from Brussels did not constitute meaningful risks. That now looks misleading. The fine may be small, but Deutsche Post is being forced to hive off an important business. Small wonder that the news pushed its shares below their issue price.

Worse, Mr Monti still has to rule on a second investigation into Deutsche Post. That case hinges on whether lucrative property sales by the group constituted state aid. If so, the receipts from such sales will have to be repaid. This money was a key factor in Deutsche Post's overall financial health before its flotation, so a finding against it in that case could have further serious consequences.

Deutsche Post is trying hard to avoid a second blow. Among its defensive measures, it has hired a former European commissioner to lobby on its behalf. And it has political cards that, if played cannily, could help its cause. Unlike Britain and France, Germany is in favour of faster liberalisation of Europe's postal businesses. The European Parliament recently watered down the commissioners' latest proposals on opening up the market. But the issue is far from decided, and the EC knows that it has to be pragmatic in nurturing allies for its reforms, notably Germany. So while it might be tough in future on Deutsche Post, it probably will not be too tough.

That leaves just one question: might Germany's love of liberalisation be driven less by ideology than by a desire to see Deutsche Post grab market share faster than less well-funded rivals? No letters, please.

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Another false dawn?

Mar 22nd 2001 | TOKYO
From The Economist print edition

Policy changes at the Bank of Japan, and more promises to clean up the banks, seem to have convinced investors that Japan does not, after all, face imminent collapse. But for how long will they remain convinced?

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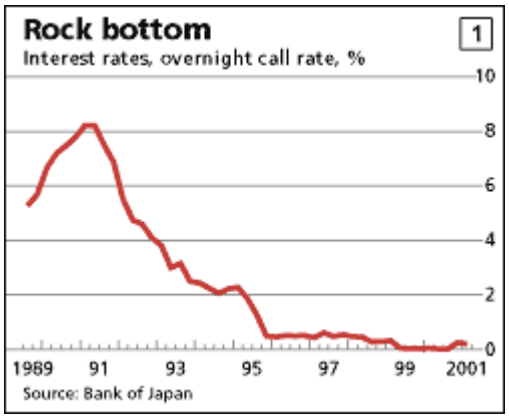
AP

Mori and Bush compare bubbles

HAS Japan at last stumbled upon a cure for its sickly economy? The stockmarket seems to think so. On March 21st, Japanese shares soared by 7.5%, with the Nikkei 225 index closing above 13,100 for the first time since February 26th. After another fall on Wall Street the day before, most pundits had forecast trouble in Tokyo. That would once again have threatened Japan's wobbly banks and its weakening economy, which the central bank admitted (on the very same day that traders were rushing to buy shares) had "come to a pause".

The stockmarket was excited about two bits of news, which it hopes are related. On March 19th, the central bank, the Bank of Japan, in effect cut interest rates back to zero, completing the reversal of its rate increase of last August, the first in ten years. On the same day, Yoshiro Mori, Japan's prime minister, who was in Washington to meet President Bush, pledged to come up with a solution to Japan's debt problems within six months.

With the newspapers full of speculation about a grand economic plan to restore the economy to health, this suddenly looked to be just what the doctor ordered: the government would force the banks to rid themselves of their bad debts, once and for all; as a salve for the pain of the bankruptcies and job losses that were sure to follow, the Bank of Japan would print lots more money; and a side deal with the Americans would pave the way for the yen's rapid fall, to ¥140 to the dollar or lower. In the space of a single day, Japan's hopelessly muddled economic policy seemed, almost miraculously, to have come together.



Dream on. Agreed, the Bank of Japan pledged much more than a rate cut: it has abandoned targeting interest rates altogether. Instead, it plans to target the quantity of money that flows through the economy. Its chosen measure is the reserves that commercial banks deposit with the central bank. It wants to push these up from ¥4 trillion ($32.5 billion) to ¥5 trillion, by flooding the markets with more money. This will have the effect of driving short-term interest rates down to zero. In another change of policy, the bank also said that it plans to hold interest rates at zero until the country shakes off what the government now admits is persistent deflation.

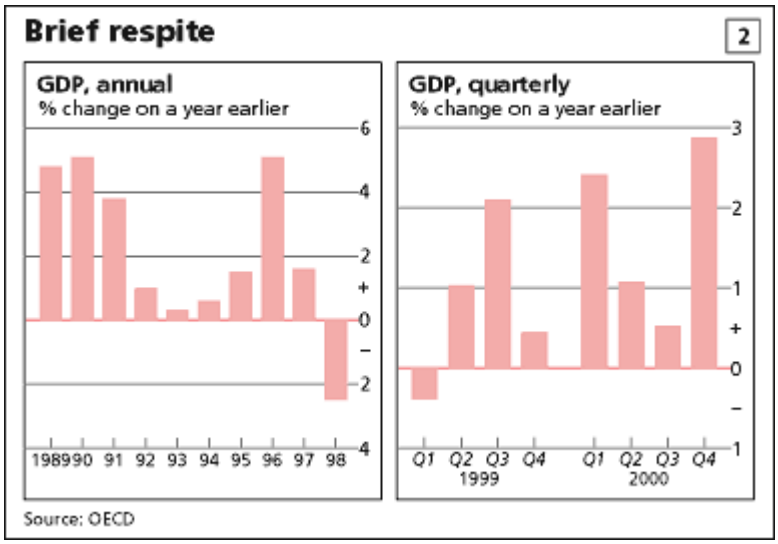
There is less to these changes, however, than meets the eye. The Bank of Japan has promised not to raise rates until prices start to rise again. It has also promised to increase the supply of money. What it has not done is explicitly to link the two, by promising to print money until it creates inflation. Yet this is what the Japanese government and some economists have been urging it to do: print lots of money, force the yen lower, and get people to start believing that prices must soon start to rise.

In fact, not only has the bank made no pledges about the circumstances under which it might print more money. It has only agreed to print just enough to force rates back to zero. It is no coincidence that, under the zero-interest-rate policy that the bank ran before last August's rate increase, commercial-bank reserves deposited with it averaged around ¥5 trillion—exactly the target that it has now adopted.

Mr Mori's Washington "pledge", meanwhile, lasted little more than a day. On March 21st, Yasuo Fukuda, the chief cabinet secretary, denied that the prime minister had meant he would clean up the banks' bad debts within six months. In fact, said Mr Fukuda, Mr Mori was referring to the government's debt problems, for which he hoped there would soon be a plan.

The political background

Salvation is still possible: the government is floating all sorts of ideas for helping the banks to rid themselves of their bad debts. It is also true that the Bank of Japan's policy changes bring it an inch or two closer to printing money to create inflation. But there are still as many uncertainties as there were at the beginning of the week. For all the talk of a co-ordinated rescue package, the government's economic policy still seems to be in a muddle. And the confusion looks set to continue. For behind the scenes rages not one but three fierce political battles.



The first of them pitches the ruling Liberal Democratic Party against the Bank of Japan. The LDP wants the bank to turn on the printing presses, but the bank continues to refuse, despite what was dressed up as a radical policy shift this week. Bolder measures may come later, hints the bank, but only if the politicians get serious about cleaning up the banking sector.

For the obtuse and hard of hearing, the Bank of Japan has put its unorthodox agenda squarely in the open. To restore sustainable growth, it said in an extraordinary footnote to its policy changes this week, it is essential to reform the financial system, the economy and industry. "Structural reform may be accompanied by painful adjustments," it warned. Without them, "neither improvement in productivity nor sustainable economic growth can be obtained."

The second tussle is over the fate of Mr Mori. Japan's stunningly unpopular prime minister has already caved in to pressure by promising to resign, albeit indirectly. But his supporters have not yet given up hope. They are trying to use the economic crisis to keep him in power for as long as possible. With the stockmarket and the banks so weak, they say, economic policy must take priority over the party's leadership battle. Mr Mori's opponents in the LDP and the media, meanwhile, are taking every opportunity to frustrate his policy initiatives. The result, up until now, has been political paralysis.

The final and most important stand-off is between the LDP's reformist minority and its conservative mainstream, over the much-scarred battleground of bank policy. Mr Miyazawa has proposed what looks like a disguised, pain-free, bank bailout, with taxpayers underwriting a fund that would take the banks' troublesome ¥45 trillion ($365 billion) or so of shares off their hands. These massive share portfolios have been the banks' biggest headache recently, because the value counts in calculating their capital. With the stockmarket so depressed, the banks now face larger deductions from their capital bases.

The reformers, on the other hand, have been pushing a tough new plan fronted by Hakuo Yanagisawa, Mr Mori's minister in charge of the bank clean-up. Mr Yanagisawa wants to write down all the banks' bad debts by March 2002. That, however, is likely to mean a rash of bankruptcies and job losses in the struggling construction and retail industries—which just happen to be the two most important constituencies for traditional LDP politicians.

Adding to the political complexity is the possibility that the outcome of one or more of these battles will influence the others, with unpredictable results. The question of who succeeds Mr Mori, for instance, is crucial to the battle over banking policy. But not even Japan's best informed political insiders have much idea about the outcome.

Pacific contagion

The proximate cause of all the muddle lies not in Japan, but in America. The weakening economy there and the collapsing market for technology shares have hurt Japan badly. Since Japan's exports to America add up to just 3% of GDP (compared with, for example, more than 8% in South Korea), the direct effects of American weakness through trade flows have been small. Moreover, contrary to widespread belief, export growth was never important to Japan's economic recovery in the first place.

Yet confidence has tumbled and the strength of the business cycle, which has been nudging the economy forward, is now in serious doubt. The recent fall in the growth of machinery orders, a good guide to future business investment, has gloomier economists predicting a business recession by the summer.

The explanation lies partly with the technology industry. One defining feature of Japan's latest recovery is that much of the country has in fact stayed in recession, from its restructuring steel makers and shipbuilders to its overborrowed high-street retailers. Growth has instead been concentrated on high-tech manufacturers, including chip makers like Fujitsu and NEC, consumer-electronics firms like Matsushita, and a whole raft of specialist mid-sized manufacturers. Richard Jerram of ING Barings, an investment bank, calculates that in the two years to the end of 2000, the electrical-machinery sector (which has a strong high-tech bias) contributed nearly two-thirds of Japan's 9.5% overall rise in industrial production. The sector's share of production, however, is just one-quarter.

Between October 1998 and February 2000, the value of Japanese technology shares tripled. With demand for computers, mobile phones, fibre-optic cable and other high-tech kit racing along, massive new business investment followed. In the year ending March 2001, for instance, Japan's five big chip makers invested a record ¥964 billion in new plant and equipment, up nearly 80% on the previous year.

Yet just as the technology industry's extravagant hopes had outsize effects on economic growth last year, so this year's gloomier sentiment threatens a wider recession. Since last summer, the price of 64 megabit DRAM computer-memory chips, an industry benchmark, has fallen by more than half, to less than $4. A sudden drop in consumer confidence in America, coupled with fears about the enormous investments of Europe's telecoms companies (along with the debts that they have amassed to make them) has deepened the gloom. Japan's technology firms have rapidly switched from record profitability to profit warnings. Business investment plans have been hurriedly shrunk, even as share prices have collapsed: since February 2000, high-tech stocks have halved in value.

Reuters

Mr Hayami strains to hear the cries of pain

The stockmarket's collapse has had unfortunate consequences, particularly for Japanese banks. Over the past decade, the banks have ditched more than ¥70 trillion of non-performing loans while trying to scrub themselves clean. But with good loans souring as fast as banks can provision against them or write them off, that much and more still sits on their books. The banks themselves are partly to blame for this: they have, until recently, been far too optimistic about the prospects for their worst borrowers.

But it is the stockmarket's tumble that has done the most damage. The banks' huge equity portfolios, until recently the source of unrealised gains which they have used to pay for bad-loan disposals, are now full of losses. With the benchmark Nikkei 225 index hovering near a 16-year low, the holes are getting bigger. After next month, when a new method of accounting (based on market values) is introduced, these portfolio losses will hurt the banks' capital bases, from which they will be subtracted. If the broader Topix stockmarket index falls to 1,178, the 16 biggest banks' net equity losses could balloon to ¥3.8 trillion, warns Yukiko Ohara of Dresdner Kleinwort Benson, an international investment bank.

A more imminent danger is that some banks might not be able to close their books for the year at the end of this month. Until next month's market-value accounting changes, they must mark down any

shares which fall below 50% of the price at which they were purchased or last revalued, a process which could push a few into insolvency. Such fears have already battered banks' shares, notably those of Daiwa Bank and Chuo Mitsui Trust, both of which have particularly dreadful-looking stock and loan portfolios.

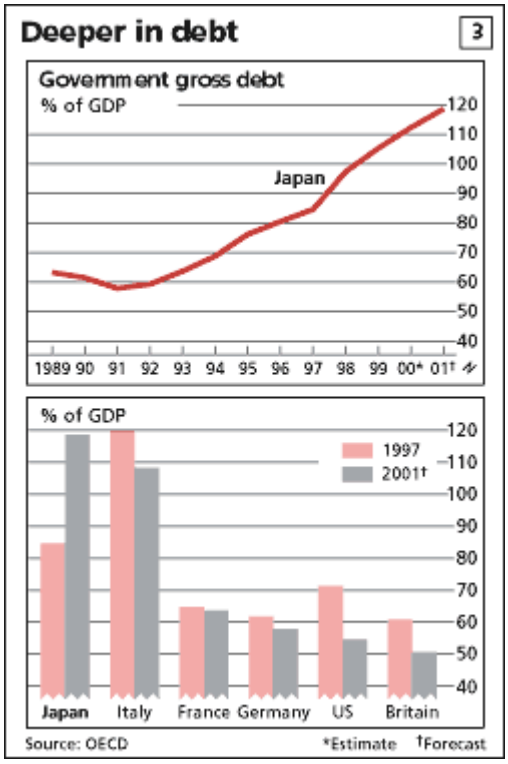
Pre-press requirements

Against this sort of headwind, it is hard to see how the Bank of Japan's latest policy can turn the banks and the economy round. It will help that the bank has committed itself to keeping interest rates at zero until prices start to rise again. That will reassure people that it is not going to repeat its mistake of last August, when it raised rates despite evidence of lingering deflation.

But free money will not make much of a difference to an economy that was already limping along with interest rates at a mere 0.15%. Rock-bottom rates do not work in Japan, and have not done so for several years. They do not encourage banks to take more risks and to make new loans, because the banks are broken. On the other hand, they do not encourage borrowers to take new loans, because they have borrowed too much already.

Printing money in huge quantities might work, as it should push the yen dramatically lower. It might also encourage people to believe that prices will start to rise again. But printing huge amounts of money is not what the central bank has promised to do. It fears trouble in Japan's government-bond market, which must finance a deficit of close to 10% of GDP and national debts of ¥666 trillion, a whopping 120% of GDP (see chart 3).

So far, the market has digested all this debt with barely a burp: ten-year bonds yield only a fraction over 1%. But the Bank of Japan worries that the sight of the central bank printing money to finance the government's deficit (which is exactly what it would be doing if it bought large amounts of government bonds) might unnerve investors. If bond yields then rose, investors might really take fright, dumping bonds and the yen. The bank might then be forced to print yet more money in order to cover the government's larger interest bill, pushing rates up further and entering a vicious circle. The risk might be small. But the possible consequences are dire.

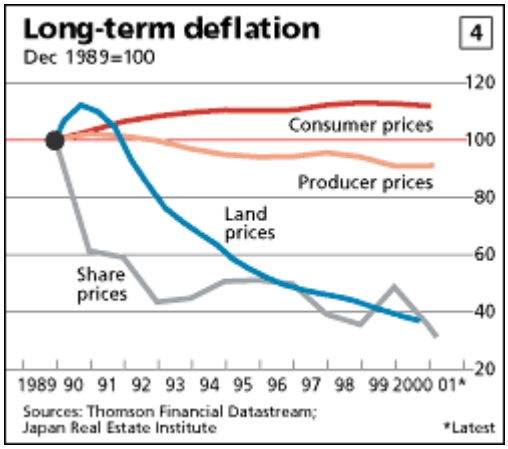


The second reason that the bank continues to resist the temptations of the printing press is that it first hopes to extract a sincere effort from the LDP to clean up the banking mess. Masaru Hayami, the central bank's brow-beaten governor, is all too aware of the popularity of printing money among the LDP's old guard. In Mr Hayami's view, conservative politicians like Shizuka Kamei, Mr Mori's policy chief, have seized on the idea as a pain-free alternative to cleaning out the debts. The banks and their borrowers would simply have their debts inflated away. Managers would then have no need to sort out their businesses, or sack their staff (or themselves), or take any other unpleasant decisions. But this would do nothing, argues the bank, for the economy's long-term health. That requires painful restructuring and, as the bank pointedly put it this week, "decisive actions...under a strong leadership of the government of Japan."

The bank is unlikely to have its wish granted any time soon. Mr Mori's administration is probably good for at least another month, while the budget goes through parliament and the LDP squabbles over a successor. During this time, however, policymaking is likely to prove challenging. Mr Mori's opponents in the party will not want to grant the prime minister any chance to make political capital out of the economic crisis, and so prolong his stay of execution. This is the main reason why Mr Mori's countermeasures for the stockmarket, which are supposed to include generous tax breaks for investors, have so far got nowhere.

The outlook beyond Mr Mori is hardly any brighter. Because the LDP cannot agree on his replacement, it now seems likely that whoever takes over will get the job only until September, when the LDP will hold yet another party leadership election. Worse, the

cabinet reshuffle that will come with a change of leadership may well scupper Mr Yanagisawa's tough new plans for the banks, as he himself faces the chop unless he waters them down. "Mr Yanagisawa is too radical," says one LDP insider. "He does not represent the party consensus." Should he go, his departure would mark the seventh change at the top of Japan's financial regulator, perhaps the most important post in the cabinet, in little more than a year.



Even if, by some miracle, Mr Yanagisawa's plan does survive in some form, the next prime minister's priorities are likely to lie elsewhere. The LDP must prepare for upper-house elections in July, at which it looks like taking a beating. If it loses the majority it now enjoys with its two coalition partners, the New Conservative Party and the Buddhist-backed New Komei Party, the opposition will be able to block the passage of all bills except the budget and international legislation. The result would be stalemate.

The LDP might not even get that far. It has its work cut out simply holding the coalition together until the summer's elections. The Buddhists, who are meant to be promoting clean government, are especially upset about Mr Mori, whose cabinets have been notably prone to scandal. This week's stockmarket rally has given the politicians some precious time. All the signs are, however, that they will fail to use it wisely.

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Highly contagious

Mar 22nd 2001
From The Economist print edition

Stockmarkets have plunged nearly everywhere, in seeming disregard of national economic prospects. Is there a new global virus in financial markets?

THE half-point cut in interest rates by America's Federal Reserve on March 20th was the third such cut this year. By past standards that counts as pretty aggressive monetary easing, but it does not seem to have satisfied stockmarket investors, who had hoped for a bigger cut. After the Fed's decision, Wall Street fell again, leaving the S&P 500 index down 27% from its peak last March. The Nasdaq has now lost more than 60% of its value. Moreover, the bears are out all over the world.

In the week before the Fed's rate cut, no fewer than 38 of the 40 stockmarkets tracked by *The Economist* fell. This week, 32 of them slid again. It is understandable that America's overvalued stockmarket should plunge once its economy started to slow. Likewise, the 35% fall in the Nikkei 225 over the past year reflects the sickly state of Japan's economy. European economies, on the other hand, are meant to be in much better shape. Household savings are comfortably high, and private-sector debt is more modest than in America. Though business confidence is dented, notably in Germany, a recession in Europe is not expected. Yet many European stockmarkets have fallen further from their peak last year than American shares (see table). Why the hammering?

Some economists think a new form of financial contagion is spreading, via stockmarkets, in a way similar (if slower) to that in which Asia's financial crisis in 1997-98 infected one economy after the other. If stockmarkets tumble in even healthy economies, then business and consumer confidence there can be hurt. Where American recessions used mainly to affect the rest of the world through trade, stockmarkets are now perhaps a more powerful channel.

Fallback

Stockmarkets	% change Jan 1st 1995 to 2000 peak		% fall, 2000 peak to March 21st 2001
	Local currency	$ terms	$ terms
United States	233	233	-27
Japan	6	-1	-46
France	251	127	-27
Germany	286	162	-35
Italy	245	179	-30
Sweden	372	299	-50
Britain	126	133	-29
Canada	170	157	-37

Source: Thomson Financial Datastream

There seem to be three main reasons for the plunge in European shares. One is that some European stockmarkets had climbed higher, and possibly become more overvalued, even than Wall Street. Between January 1995 and its peak last year, the S&P 500 rose by 233%; in local-currency terms, the markets in Germany and Sweden rose by 286% and 372%, respectively. (In dollar terms they rose somewhat less.) A year ago, the Nasdaq's valuations did indeed look crazy. But the price-earnings (p/e) ratios of European high-tech shares looked crazier still.

In part, this was because the choice of "new economy" shares was more limited in Europe than in America, while the demand for those shares at home was strong. Peter Oppenheimer, a strategist at HSBC, a global bank, calculates that (at their peak) high-tech shares in Europe were discounting an average real profit growth over the next ten years of 19% a year. That compared with 14% real growth for American high-tech shares. So it is hardly surprising that European stockmarkets have since tumbled.

But though the gap has closed, high-tech shares still seem to be discounting slightly faster profit growth in Europe than in America. For the broader market, shares in Europe now look more attractive than those in America, with lower p/e ratios.

A second reason why European shares seem to have parted from their underlying economies is that many large, European companies are exposed to demand in America. In 1999, for instance, 21% of the sales of European firms went to the Americas (north and south), up from 16% in 1998. Last year, that share was no doubt higher still, given the buying spree that European firms have enjoyed in the United States. According to Morgan Stanley, sales of European companies' American-based affiliates were four times as big as their exports in 1998 (the latest figures available). Now those sales are being squeezed. Figures from America's Department of Commerce show that the income of European firms' American affiliates fell by 20% in the year to the fourth quarter of 2000.

European firms' profits are also exposed to swings in the exchange rate of the euro against the dollar. Until now, the dollar has been strong. But if America actually went into recession, the greenback might weaken. That, in turn, would reduce the dollar profits of European firms when converted into local currency. Europe's multinationals are far from being immune to America's slowdown.

The third factor in the fall in European share prices is the longer-term evidence that stockmarkets are becoming more correlated with one another (see article). Research by William Goetzmann, an economist at the International Centre for Finance at Yale University, shows that during the 1990s the correlation between American and European share prices rose to its highest this century—except for during the Great Depression.

Some increased correlation is the inevitable effect of greater cross-border movements of capital and technology. Yet in times of crisis, correlations tend to get closer. Current unease in financial markets has eroded investors' appetite for risk, encouraging them everywhere, not just in America, to shift from equities into safer bonds. And in America, as share prices tumble, the risk models used by financial institutions also force them to sell overseas equities to reduce the overall riskiness of their portfolios. This also helps to explain the otherwise puzzling rise of the dollar of late.

Chain reactions

Not only do stockmarkets move more closely together these days; worldwide, stockmarket capitalisation counts for more, as a proportion of world GDP, than it used to. The $10 trillion of paper wealth that has been destroyed worldwide over the past year accounts for about 30% of world GDP. Never has so much been lost in such a short time.

Still, stockmarkets are only one of several new forces of potential contagion in a more globalised era. Traditionally, standard economic models judged the likely impact of an American recession on the rest of the world by focusing mainly on trade links. Today these models should worry Mexico and Canada, whose exports to America account for one-quarter and one-third of their GDP respectively. But Europe is relatively immune, through trade links, to an American recession. The EU's exports to America account for less than 3% of its GDP. However, as indicated above, this understates Europe's true exposure to the American market.

Another new way in which conventional trade links may underestimate the worldwide impact of an American downturn is the world-girdling supply chain in information technology (IT). East Asian economies, which are big IT producers, may be particularly exposed. America's boom in IT spending pulled in lots of imports from Asia, and helped the region to recover from its crisis in 1997-98. But as America's boom turns to bust, IT imports are likely to collapse, hitting Asia harder than in past American downturns. Growth forecasts through the region are being chopped. South Korea's GDP actually fell in the fourth quarter.

According to Andy Xie, at Morgan Stanley in Hong Kong, IT equipment accounts for well over half of Taiwan's and South Korea's exports to America and 80% of Malaysia's. The bank forecasts that growth in America's total imports will slow from 14% last year to only 1% this year. That would be the sharpest deceleration in import growth in almost two decades. The slump in America's imports of IT equipment will be even sharper. Recent Asian data suggests that the region's exports of IT equipment to the United States have already fallen by 15% over the past year. Japanese firms are also slashing their IT budgets. America and Japan together account for almost half of East Asia's total exports. It is through the complex of cross-border IT supply chains, and through more integrated financial markets, that a more virulent

sort of global virus might travel.

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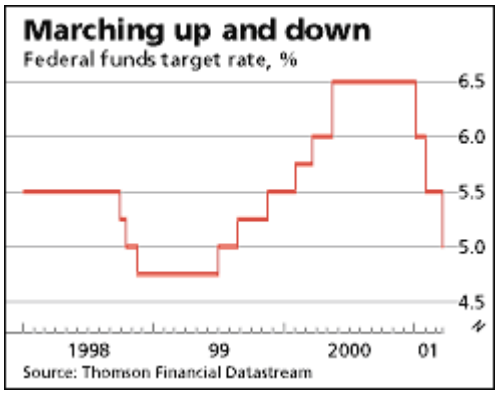
Rates going down

Mar 22nd 2001 | NEW YORK
From The Economist print edition

AFTER three half-point reductions in interest rates in as many months, Alan Greenspan has got the cutting habit. How low will he go? Futures markets already predict at least two more rate cuts, of a quarter-point each, by the end of the Federal Reserve's meeting on June 26th-27th, with a 60% chance of a third cut by then, too. That would reduce the short-term interest rate to either 4.5% or 4.25%, down from 6.5% at the start of this year. In less than a year interest rates will have gone from a ten-year high to a seven-year low.

Many economists on Wall Street think that Mr Greenspan's rate-cutting will exceed even what the markets expect. Stephen Slifer, at Lehman Brothers, thinks that the rate will fall to 4% in May, and perhaps to 3% by the third quarter of this year. At the time of the 1990-91 recession, the Fed slashed interest rates from 8% to 3%. That represented, at its lowest, a real interest rate of zero. Today, depending on whether you look at the "headline" rate of inflation or the "core" rate, a zero real rate would be around 2.75-3.5%.



America's economy was officially in recession in the early 1990s, and is not necessarily back in that state now. On the other hand, even if it is still growing, growth has probably dropped at least as far below its potential rate as it did a decade ago—and it is that gap between actual and potential performance that should drive monetary policy. As a rule of thumb, a 2% real interest rate—ie, roughly what it is now—represents a merely "neutral" monetary policy, whereas below-trend economic growth, not to mention recession, demands a loosening stance.

Mr Greenspan shows no sign of being constrained by Wall Street chatter about the possible return of stagflation, the bête noire of the 1970s. Core inflation continued its upward creep in February, driven by big increases in medical costs and tobacco prices. Yet the Fed has seldom seemed less worried by the outlook for prices, perhaps because energy costs seem likely to fall sharply in coming months. After this week's rate cut, the Fed said that when it weighed up its twin goals, of price stability and sustainable economic growth, "the risks are weighted mainly toward conditions that may generate economic weakness in the foreseeable future."

This week's half-point cut went down badly with share investors, because they wanted a three-quarter-point cut and interpreted Mr Greenspan's more modest offering as a signal that he will do only what the economy requires, not what the stockmarket craves. On the other hand, there will be a striking break with recent experience if share prices do not bounce soon. Each of the past five times when the Fed has cut rates thrice within three months, the stockmarket has rallied. Investors may now prefer fighting the Fed—usually a cardinal sin—to fighting the outlook for corporate profits, which continues to worsen with each passing day.

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Exchange-rate systems

Argentina in a fix

Mar 22nd 2001
From The Economist print edition

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FOR much of the 1990s, Argentina was regarded as an emerging-market success story. And much of its success was attributed to its adoption in 1991 of a convertibility law, pegging the currency, the peso, to the American dollar: every peso in circulation had to be backed by a dollar in reserves. This type of "currency board" arrangement is super-fashionable among economists. So much so that Argentina's descent into economic crisis (see article) is also a crisis for the prevailing orthodoxy about emerging-market exchange-rate policy.

In recent years, whenever an emerging economy's currency—be it the Indonesian rupiah, the Russian rouble, the Brazilian *real* or the Turkish lira—has hit the rocks, some wise man has been on hand to tell the flailing government that a currency board would solve all its troubles. It was argued that countries had only two choices: to allow their currencies to float freely or, conversely, to fix them by means of a currency board. Short of outright dollarisation, this is the cast-iron way to fix a currency. It amounts to an open-ended promise to swap dollars for pesos at the promised parity.

Such a system worked, for example, for Hong Kong, whose dollar weathered the Asian currency crisis of 1997-98. It means that the government forgoes its right to set its own monetary policy. But, in return, it gains a strong weapon against inflation, and the advantages of lower interest rates than would be needed to maintain a less-solidly backed peg. In Argentina, for example, inflation was tamed and, for most of the 1990s, interest rates were lower than, say, in Brazil.

Now the country is tasting some of the drawbacks to a currency board, and it is fitting that the man drafted in as the government's new economic-policy chief is Domingo Cavallo, architect of the convertibility law. The strength of the dollar has pulled the peso up to damaging heights. It has looked particularly overvalued since Brazil was forced two years ago to float its currency, which has since sunk by more than 40% against the dollar.

For Argentina, with its currency board, devaluation is a far more drastic option than it was even for Brazil, where the crisis surrounding the flotation of the *real* was bad enough. On the other hand, without a devaluation, Argentina's solvency looks dubious. The costs of its borrowing both at home and abroad have soared—not because of worries that the currency peg might be broken, but for fear that the country might default on its debts. Instead of an exchange-rate risk, investors see a worsening credit risk—and since Argentine bonds account for nearly a quarter of all tradable emerging-market debt, this has wide repercussions elsewhere.

But if currency boards bring troubles of their own, so do all the other options. Weaker pegs, such as the one that Thailand used to keep its currency (the baht) stable, are now recognised as dangerous. When investors lose confidence, as happened in Thailand in 1997, interest rates soar, and the government is forced either to spend its foreign-exchange reserves propping up the currency (as Thailand did), or to impose capital controls (as happened in Malaysia the next year).

Similarly, "crawling-band" regimes have had a bad press. Variants of this system were used, with bad results, in Indonesia, Brazil and Turkey. Instead of fixing the currency at a set parity, the government lets its value fluctuate within a pre-set range; and that range itself moves over time against the other currency (usually downwards).

Nor do "free-floating" exchange-rate systems provide an easy solution. Few governments are willing to

leave the exchange rate entirely up to the market. For good reason: pure floats are vulnerable, at times of extreme market turbulence, to shuddering exchange-rate shocks. And, even in the medium-to-long term, foreign-exchange markets are capable of producing currency misalignments.

In many emerging markets, the apparent failure of an exchange-rate system also looks like the failure of the IMF, on whose authority the policy has been followed. But usually, and certainly in Argentina, as in Turkey last month, the real dangers are political. It is not so much the exchange-rate system that has crumbled, but more the faith of investors in the government's ability to deliver the policies needed to maintain it.

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Economics focus

Dancing in step

Mar 22nd 2001
From The Economist print edition

Individual stockmarkets are increasingly being driven by global rather than local factors

AMERICA'S stockmarket has slumped as its economy has slowed abruptly, and Wall Street appears to be dragging the rest of the world's markets down with it. But why do other markets not have a mind of their own? They did have once.

Traditionally, one way that investors sought to reduce risk was by diversifying overseas: when American shares slumped, the loss there would be offset by a gain in, say, European shares. That, at any rate, was the theory. In recent years, however, stockmarkets seem to have moved more closely in step with one another. Globalisation and the information-technology (IT) boom appear to have increased the importance of worldwide factors in steering share prices, at the expense of local country factors. A severe profits warning from a big high-tech firm in America, for example, is now likely to hammer high-tech share prices all around the world.

The correlation between changes in American and European share prices has risen from 0.4 in the mid-1990s to 0.8 last year. Crudely, that means that movements on Wall Street can explain 80% of price movements in Europe. (A correlation coefficient of zero implies no relationship at all; a value of one means that they move perfectly in step.) Markets were as highly correlated as this for a while in the late 1980s, but the long-term trend is upward.

The health of a market's home economy may matter less than it used to for a number of reasons. First, the scrapping of controls on capital (combined with more efficient trading systems) has increased cross-border trading of shares, creating something closer to a global equity market. Secondly, it has become increasingly common for big companies to be listed on more than one market. Thirdly, as a result of the wave of cross-border mergers and acquisitions, overseas profits account for a bigger slice of many companies' overall profits—high-tech firms are especially global in their reach. And finally, the Internet has made it easier for investors to get information on foreign firms. So firms in the same industry, but in different economies, are valued on a similar basis.

By breaking down movements in share prices into global effects, country-specific effects (such as different economic cycles), and firm-specific effects, a new study* by economists at the IMF tries to find out what percentage of a stock's performance is due to global rather than country factors.

The study is more geographically comprehensive than previous studies on the subject. It includes around 5,500 firms in 21 developed and 19 emerging economies, covering nine-tenths of these countries' total stockmarket capitalisation. Firms were grouped into ten industrial categories, such as basic industries, IT, and financials. The authors then calculated the monthly returns in dollar terms during the period from March 1986 to August 2000.

They used the data to build a model that estimates over time the percentage of the total movement in share prices that is explained by changes in global factors, as opposed to country-specific ones. The model distinguishes between two kinds of global factor: the global business cycle; and global-industry effects that similarly influence firms in the same sector, but in different countries. The authors also measured the relative importance of what they call the global "new economy" factor—that is, of

movements in the prices of high-tech stocks in determining overall returns.

High-tech contagion

Thestudy finds that there has indeed been a big increase in the importance of global factors—of both kinds—in explaining movements in share prices since the mid-1990s. In developed countries, the country-specific factor has meanwhile fallen. But in some emerging markets it has sharply increased since Asia's financial crisis in 1997-98.

The increased importance of global factors in the IMF's model could be confirmation that equity markets have become more integrated. Alternatively, it could simply reflect the fact that stockmarkets tend to be more correlated at times of high volatility in share prices; during calmer periods, correlations tend to be weaker. That partly explains why the importance of global factors follows a U-shape: high in the late 1980s and early 1990s, then high again in the second half of the 1990s. The early period covered the 1987 stockmarket crash and the Gulf war; the latter period, the Asian crisis.

The importance of the global-industry effect on share prices has been increasing. In recent years, it has accounted for 28% of the variation in stock returns, compared with 11% in 1988-91. The fact that a firm belongs to a particular industry—be it telecoms or utilities—has become more important in explaining variations in returns over time. A firm's home country has become less important. It seems that if investors are to reduce risk these days, they should diversify more by industry than by country. Diversification by country offers less protection than it used to.

The increased correlation between shares in recent years is due to more than just the Asian crisis. By far the most important global factor explaining increased correlation has been information technology; movements in IT shares are much more highly correlated than non-tech stocks. According to other IMF work, the correlation between European and American IT shares between January 1999 and May 2000 was 0.85; for non-IT stocks it was just 0.54. IT shares in Asia and America had a correlation of 0.75, non-IT shares only 0.35.

The paper, written before the latest plunge in markets, is silent on the question of how much of the surge in high-tech shares was a bubble. But it warns that if it was a bubble, then high-tech stocks may be a new channel for financial contagion to spread throughout the world economy.

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* "The New Economy and Global Stock Returns" by Robin Brooks and Luis Catao, IMF Working Paper 216, December 2000.

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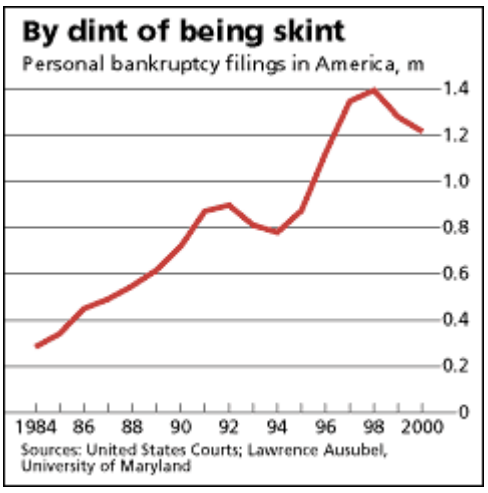
A bankruptcy bill

Mar 22nd 2001
From The Economist print edition

AMERICA'S Senate has now passed legislation to limit the ability of individuals to hide behind the shelter that bankruptcy protection provides. All well and good: no point in coddling deadbeats. But the measure will have one unintended consequence. It will take some spark from America's entrepreneurial spirit.

The new bill makes a slew of revisions to the Bankruptcy Reform Act of 1978, thanks to which personal bankruptcies have grown throughout boom and bust (see chart). If, as expected, the bill becomes law, then the claims of those filing for bankruptcy who have incomes above their state's median will be presumed frivolous unless proven otherwise. People who have already filed at least once for bankruptcy will be presumed to be in bad faith if they do so again. In addition, creditors will have an easier time seizing homes, cars and other chattels.

If the market for consumer credit were truly competitive, then the wider economic effects of the bill would be easy to predict. Lenders would extend more credit at a given interest rate, since the chance of repayment would be higher. Borrowers would want smaller loans at a given rate, since they would be less protected in the event of a default. A boost in the supply of loans and a drop in their demand would force interest rates down.



But Michelle White, who studies bankruptcies at the University of Michigan, thinks this will not necessarily happen. She points to the oligopolistic nature of the credit-card industry, dominated by a handful of powerful players who keep out new entrants. When demand for credit falls, these players have an incentive to raise rates, not lower them, in order to keep profits high. Ms White also points out that only about 10% of filers would be affected by the median-income provision, so the direct impact of the bill on rates would be fairly small.

The more worrisome aspect of the Senate's bill is how it might change the behaviour of this 10%. They are likely to be more entrepreneurial than those with lower incomes, and Ms White believes that the bill could discourage them from starting businesses. All the debts created by a small, unincorporated firm become the debts of the founder in the event of a bankruptcy. According to the new bill, a failed entrepreneur who can earn a decent income would be obliged to stay jobless for the time it took the courts to sort out his affairs; he would otherwise risk losing any possibility of relief. Ms White's most recent research shows how states with protections on top of those provided by federal bankruptcy laws have more entrepreneurs. The threat, it seems, is real.

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Retail banking

Beautifying branches

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From The Economist print edition

Instead of axing their branches, banks are inventing new ways to make money out of them

BANK branches in most parts of the world are home to ugly carpets, grumpy cashiers behind glass barriers, long queues of customers and racks of dull leaflets. Most people visit such purgatories only when they have to; the notion of impulse buying there is a cause for mirth. According to Abbey National, a British bank which filmed passers-by, window-shoppers actually speed up in order to avoid bank branches.

For banks, this is a sorry state, since branches are horribly expensive to keep open. On average, branches and their staff account for about half of the costs of a typical retail bank. Bankers at one stage hoped that they might be able to persuade their customers to do business through the Internet, allowing branches to be shut down. But customers have since made it clear that while they want the convenience of Internet banking, they also insist on branches. A public-relations disaster at Barclays Bank, which closed 171 British branches on a single day last year, has made others very wary of trying something similar.

When slashing costly branch networks is out of the question, banks are trying to find ways to generate more money from their branches. One strategy is to transform them into enticing, shop-like places where people want to spend time and, with luck, more money on financial products. After Portugal's biggest bank, Banco Comercial Portugues, bought Banco Portugues do Atlantico, it hired a consultancy, John Ryan, to help revamp its outlets. "Atlantico used to be one of the drabbest banks, with bad lighting and laminated 1950s furniture," says Linda Lockhart at John Ryan, whose retail training was as a lingerie buyer for Bloomingdale's.

After the makeover, Atlantico's branches emerged with honey-coloured wood panelling, awnings and financial "theatres" where customers are educated about how to control their finances. The staff are now known as "retailers". Rather than sit passively behind desks, they stroll around and talk to people.

Other financial institutions use more radical tactics. Abbey National in Britain, for instance, is trying a system in which 64 of its branches are treated as quasi-franchises. Instead of a fixed salary, the eight managers of these branches are paid, amongst a number of parameters, according to the volume of products they sell. The idea is not just that branch managers will be keener to attract new customers; they are also likely to know better than head office what people want. If the branches succeed in boosting revenue, and if Britain's Financial Services Authority gives the nod, Abbey National intends to turn these branches into independent companies. So far, so good: the five geographical areas that Abbey National chose for franchising have increased their sales by 20% more than its fully-controlled branches since August last year.

Fortis, a Dutch-Belgian provider of financial services, also uses a form of franchising: the head of each of its 400 smaller branches is viewed as self-employed and paid about a quarter of the branch's revenues. Fortis says that the ratio of costs to revenues is 10% better in these franchised branches than in the ordinary ones. Citigroup, which has already experimented with franchising in Belgium, says that it is considering something similar for Germany.

Slippery

Most banks, however, fear the loss of control that franchising can entail. The main risk is to a bank's brand. The people who run the franchised branches might, for instance, ramp up short-term profits simply by cutting corners and reducing service. Colonial State Bank in Australia, another bank that decided to franchise its branches, found that while sales leapt, so too did complaints. Some of its 87 franchisees were removed.

So far, Abbey National's franchisees have made only small changes. They have got rid of the "Customer Services" badges that the branch workers used to wear. Instead, staff wear their own names. In the centralised system, Abbey's head office simply issued orders to branches, which meant that local knowledge went unheeded. "The boffins in marketing would use us for experiments," says Alf Langley, a franchise manager in north London. "We felt like depositories for posters." Now the branches are less deferential. Alan Thomas, a franchisee in Wales, sent back a load of posters and leaflets which advertised loans for houses valued at over £200,000 ($285,000). In Merthyr Tydfil, he pointed out, no houses cost that much. Instead, Mr Thomas created his own marketing material, in Welsh.

If people are turned off by bank branches, another line of thinking goes, then put something else in them that they actually enjoy. In Japan, Suruga Bank has invited Starbucks coffee shops on to its premises, a trick also used by Wells Fargo in America and Abbey National (with Costa Coffee) in Britain. The Bank of Yokohama offers McDonald's hamburgers alongside its cash machines. The banks get rent for letting out their branch space, but their fonder hope is that people who come in for an espresso will fancy something in the financial line. But it takes a leap, it scarcely needs saying, to go from ordering a coffee to buying a mortgage.

Perhaps the most radical answer to the question of what to do with branches is a plan by two British mutual societies to share their premises for day-to-day transactions. Between them, the Yorkshire Building Society and Britannia have 322 branches in Britain. By sharing, they will both in effect double the size of their network at no extra cost. Eventually, the Yorkshire Building Society hopes, Britain's remaining mutual societies (all 65 of them) will join the network. If that happens, the group could close overlapping branches and save money without annoying customers, because there would still be a shared branch for them to use. Conventional banks could do the same thing, of course, but they are still too suspicious that their customers might defect to the bank on the far side of the room.

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Bank loans in America

Shell game

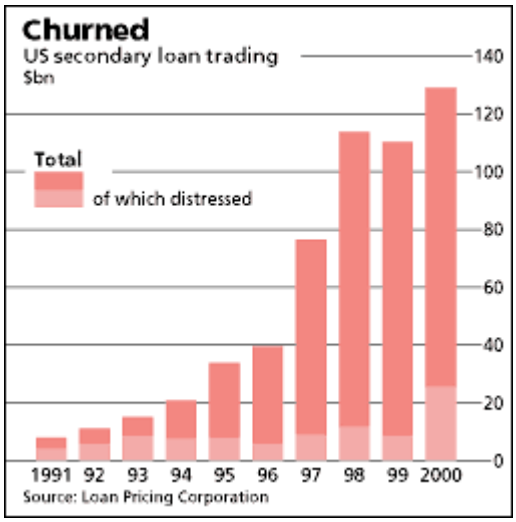
Mar 22nd 2001 | NEW YORK
From The Economist print edition

AMERICAN banks with problem loans have been finding a new exit for them, away from the public eye: they have been putting them in their trading account. At a time of worsening credit quality, more banks may be disguising their mounting problems in this way, which could mean a can of worms to be opened at some later date. That, anyway, is what some regulators fear, and they have been moved to action—carefully, in the hope that the can won't need to be opened at all.

Jealous investment banks are less circumspect. In a week of bad first-quarter results, they have been looking for excuses. One of their gripes is the luxury that commercial banks enjoy in deciding where to keep their bad loans: in their banking book, where they make provisions only if the loans are clearly "impaired"; or in their "held for sale" portfolio, managing the loans' fall in value less publicly. Investment banks have to mark their loan portfolio to market from the outset. Commercial banks have a one-time chance to choose when to shift assets from one part of their business to another.

This week, American bank regulators quietly gave new guidance on how banks should account for those loans on their books that they decide to trade. The regulators are worried that, as credit quality falls, banks will be tempted to put more and more bad loans into their trading portfolio, without showing a provision for them. That makes it more difficult for outsiders (shareholders, debt-holders, regulators, etc) to value the bank.

The secondary market for bank debt has ballooned, to $125 billion a year (see chart), as banks have sold more straight loans or packaged them into securities, sometimes attached to derivatives. That activity has allowed banks to be more obscure about how they value assets as they recategorise them from "loans held to maturity" to "loans held for sale". There is plenty of scope for fudging any fall in value.



Mutual funds which invest in bank loans have shown a 10% drop in value since last autumn, according to Lipper, a tracking service. At the same time, the biggest commercial banks have written off less than 1% of their portfolios of similar loans, and they have added no more than 2% in reserves, according to Mitchell Securities, an investment-research firm. So where did the bad loans go? Experience suggests that they are lurking somewhere in the banks, but without being provided for.

Consider the case of First Union Bank of Charlotte, North Carolina. Last year, in a restructuring, it transferred from its loan book some $7.9 billion of loans at their then market value; it deducted a reserve of $1 billion; and then it stuck a for-sale sign on them. The bank disclosed that it was also taking a hit of $650m on its income statement, and hence made no provision for these loans on its balance sheet. After selling around $2 billion of the loans, it ended the year with $4.2 billion still in the for-sale account. Recently, after discussion with regulators, chiefly the Office of the Comptroller of the Currency (OCC), it converted the $650m income hit into a loan-loss provision.

Both sides in this tussle admit that accepted practice has crept into a grey area. The policy on how to deal with loan transfers was set by the Securities & Exchange Commission in the late 1980s, after the collapse and restructuring of Continental Illinois. In the restructuring, Continental moved its bad loans into a trading portfolio. Around the same time, Mellon Bank spun off its bad loans into a "junk bank".

Both banks made provisions. But modern proponents of loan trading argue that they are not generally dealing with bad or problem loans (though note that the chart shows how the distressed component is increasing). If the loans are valued at par or above, there is no need to make a provision, wherever they are kept in the bank. Once in the trading book, the loans are marked to market daily. In the loan book, they are held either at par, or at “fair-value” if there is concern about repayment.

Regulators suspect, however, that some banks have been trying to mislead outsiders about the extent of their problem loans, by putting them into a new category. By not charging the entire write-down to the loan-loss reserve, and by “putting a piece here, a piece there,” says a regulator, “banks hoped people wouldn’t be smart enough to catch on.” Why haven’t banks’ auditors straightened this out? An official at the OCC says that regulators fondly thought generally accepted accounting principles would ensure proper behaviour. But in a grey area such as this, auditors “too often side with their clients”.

The regulators’ new guidance is just an interim measure. There is a running debate between regulators, auditors and banks on how loans should be valued in the core portfolio. The Financial Accounting Standards Board (FASB) put out a paper last December suggesting that all financial instruments should be booked at fair value, including bank loans held to maturity. While that would reduce the scope for banks to play tricks with loan transfers, it risks making their share price and deposit base more volatile, rendering them more sensitive to daily market movements. Comments on the FASB paper, from regulators and practitioners, are expected by June.

An accounting standard which targets instruments, not institutions, might level the playing field a little. Today, non-banks such as insurance firms and corporate conglomerates are buying and trading bank loans under less regulation and lighter capital charges than banks. Immoderate zeal from the banks’ watchdogs could drive more business beyond their watchful eye.

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Equal and opposite forces

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From The Economist print edition

American particle physicists are nursing hopes of a new collider that will outclass Europe's. Don't hold your breath

IF ALICE were to fall into one of the massive underground tunnels of a sub-atomic-particle accelerator, she might easily think that she was back in Wonderland. Inside the rabbit hole of high-energy physics, objects disappear in bursts of energy, but leave traces hanging around like the suspended grins of Cheshire Cats. Scraps of matter pop up in strangely symmetric pairs, as if they were tiny Tweedledums and Tweedledees. The last predicted piece of the "Standard Model" of the universe, an object known as the Higgs boson, is constantly darting around just out of sight of its pursuers, like Alice's elusive White Rabbit. And most frustratingly of all, the rules of the Red Queen hold sway here as well: you must run faster and faster simply to stay in the same place.

The place that American physicists want to be in is the one they occupy now—right at the top. At the moment, the world's most powerful particle accelerator is at Fermilab, near Chicago. Fresh from a $370m renovation, the Tevatron, as this accelerator is known, will be ready to restart the search for the Higgs boson in May. But a rival is on the horizon. In November 2000, CERN, a multinational European laboratory located near Geneva, started building an accelerator called the Large Hadron Collider (LHC). This will be seven times more powerful than the Tevatron—powerful enough, its protagonists hope, not only to find the Higgs if the Tevatron cannot, but also to look at physics beyond the Standard Model. It should, if all goes well, be able to decide which of the three theories competing to supersede that model (known, with the whimsy that the subject's practitioners like to apply to their ideas, as "supersymmetry", "technicolour" and "extra dimensions") is actually correct.

If they are to trump that, America's physicists will soon have to start work on a new machine of their own. The past few weeks have seen meetings at the Illinois Institute of Technology, and at Johns Hopkins University in Baltimore, that are designed to hurry that process along. But they have also seen the publication of the federal science budget, a document which confirms that in the government's eyes, biology is now the queen of sciences. Nor has anyone forgotten the failure of the Superconducting Supercollider (SSC), a project that put a massive hole in Congress's pocket as well as a big (and still empty) hole in the ground in Texas. In 1993, when Congress stopped financing it, the project's estimated budget had ballooned to $13 billion. So, to get their new accelerator, America's physicists will have to present both a compelling case and a united front.

Circular arguments

The first step is to decide what kind of collider to unite behind. Two options are available—one that runs on electrons and one that runs on protons. CERN's Large Electron-Positron (LEP) ring, which was closed in order to liberate the tunnel housing it for the machinery of the LHC, worked by smashing electrons and their antimatter equivalents, positrons, together. The Tevatron uses protons and antiprotons (which both

belong to a class of particle called the hadron) in the same way, while the LHC will use two colliding beams of protons.

All of these machines are hollow rings. Beams of particles are sent around the ring in opposite directions, propelled by electrical fields and guided by magnetic ones. This can be done simultaneously in a single ring if particles and their antiparticles are used, because these objects have opposite electric charges, and thus set off in opposite directions in response to the same electric field; otherwise, two intersecting rings with opposite fields are needed.

On each circuit, the particles are given a kick that boosts their speed. Eventually, the beams are deflected so that they cross each other, allowing some of their constituent particles to collide head-on. The result, built out of the kinetic energy of the colliding particles (via Einstein's famous equation $E=mc^2$), is a shower of new particles and their antiparticles. The higher the energy of collision, the more exotic the particles that emerge. But to find those particles that will distinguish between supersymmetry, technicolour and extra dimensions will probably require energies beyond the reach even of the upgraded Tevatron.

The energies of particles in accelerators are measured in electron-volts. Existing machines operate in the range of billions or trillions of electron-volts. The LHC should be able to reach energies of 14 trillion electron-volts (TeV). The meeting at the Illinois Institute of Technology, however, discussed the possibility of building a machine dubbed the Very Large Hadron Collider (VLHC). This would be able to reach energies more than ten times higher than the LHC. According to Daniel Kaplan, the director of the Centre for Accelerator and Particle Physics at the institute, such a collider would be about 230km in circumference.

But there may be reasons to pick electrons for the next collider instead of protons. One is political. It would, as Michael Witherell, Fermilab's director, points out, be hard to convince the government to pay for a project as big as the VLHC until the LHC has first proved that the idea is worthwhile. There would be pressure to let the European experiment run its course, in order to avoid pointless duplication—and the LHC may easily operate for the next decade or two.

There is also a technical reason for preferring electrons. Unlike protons, which are made of sub-units called quarks, electrons are truly elementary particles. For protons, the collisions that generate the objects of interest to physicists are actually between individual quarks inside the protons and antiprotons concerned. Since the kinetic energy of a proton is distributed between its quarks, each effective collision is at significantly lower energy than would be the case if protons were truly elementary. As a rule of thumb, that means a given electron machine performs as well as a proton machine that is ten times as powerful.

But when electrons travel along a curve, they radiate energy (this is also true of protons, but because they are more massive, quantum theory dictates that the energy loss is less). That makes electron rings extremely power-hungry. Several laboratories that have built small electron rings in the past—SLAC at Stanford University in America, DESY at Hamburg in Germany, and KEK at Tsukuba in Japan—now agree that the only way to increase energy with electrons is to build an accelerator that runs in a straight line.

Such "linear" colliders, though once popular (SLAC actually stands for "Stanford Linear Accelerator"), were eventually shunned by physicists because they cannot deliver an indefinite number of kicks to a particle in the way that a ring can. But they do not suffer the energy losses of a ring, either. And these energy losses grow as the fourth power of the desired final energy (ie, every doubling of the final energy multiplies the losses 16 times). At the energies which modern physics demands, that tips the balance in favour of the linear machines.

For the past decade, physicists at SLAC have been developing plans for just such a linear collider. Fermilab has now joined the Stanford team to collaborate on the final stages of research for this design. It was this group which met at Johns Hopkins to outline its plans. According to Nan Phinney, one of the team at Stanford, a linear electron collider could reach one TeV in energy, putting it in the same range of sensitivity as the 14 TeV proton-based LHC.

Before they can collide matter with antimatter in this way, however, physicists in America will have to learn what happens when money meets antimoney. At the moment, the price of an electron collider remains veiled in comfortable obscurity in the range of $5 billion-10 billion. That will need to be sharpened up. As the late senator Everett Dirksen so memorably put it: "A billion here, a billion there—pretty soon, you're talking about real money." The wisest course might yet be for the Americans to

swallow their pride and join more international collaborations, where the science comes with less glory, but is cheaper. Sometimes it is necessary to stoop to conquer, even when the object of the conquest is Nature herself.

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Cluster buster

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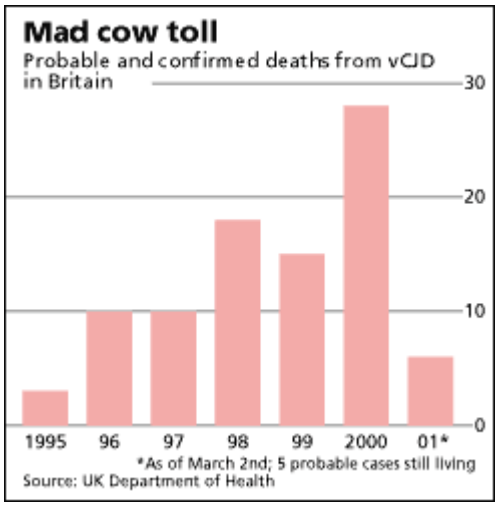
From The Economist print edition

EIGHT months ago, the village of Queniborough and its surroundings in Leicestershire gained dubious distinction as Britain's hot spot for variant Creuzfeldt-Jakob disease (vCJD), a fatal neurodegenerative condition related to bovine spongiform encephalopathy (BSE)—better known as mad-cow disease. Out of 95 cases of vCJD reported in Britain since 1995 (see chart) five occurred there.

This clustering of cases has proved a boon to epidemiologists trying to come to grips with the elusive origin and spread of vCJD. On March 21st, a team of government experts announced what it believes may lie at the heart of the Leicestershire vCJD outbreak: consumption of meat contaminated with BSE-infected brain tissue.



That may be no great surprise, but according to Gerry Bryant, one of the investigators, this is the first clear demonstration of an association between vCJD and BSE through diet. The authorities were able to rule out blood transfusions, vaccines and occupational exposure, as these were not shared by the five victims. They did find, however, that the victims had all bought meat from a handful of local butchers who either slaughtered cattle in their own back rooms or used small abattoirs nearby.

Unlike the large abattoirs employed by supermarkets, these operations practised "pithing"—ramming a rod through an animal's brain to squash the spinal cord. This rough and ready procedure (which has since been banned) allows bits of brain to leak out and contaminate other tissues.

Local slaughter houses also regularly removed the brains of beef cattle to sell to people who had acquired a taste for them, and then used the same knives for other butchery tasks—an obvious source of cross-contamination, albeit unwitting, since the butchers concerned could not have known the risks. The study has found that those with the disease were 15 times more likely to have bought and consumed beef from a butcher where such cross-contamination may have occurred than were those living in the same area who did not develop the disease.

The Leicestershire study also provides the first hard estimate of the incubation period of vCJD. The investigators reckon that between ten and 16 years passed between the victims' consumption of BSE-infected meat and the onset of their symptoms. As Robert Will, head of the National CJD Surveillance Unit in Edinburgh, points out, this number will help epidemiologists refine their estimates of the potential size of the epidemic. (These now range from hundreds to thousands of cases.)

The link between diet and vCJD will set alarms ringing across Britain. It will also worry people in the rest of Europe, which appears to be on the threshold of its own BSE epidemic. Already, three cases of vCJD have been reported in France. How many more will appear, and where, is hard to say. As Dr Will cautions, the Leicestershire findings are an important step forward in the study of vCJD, but they probably do not account for all the cases of the disease to date, given the other possible routes of exposure. When it comes to vCJD, researchers still have more questions than answers.

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Autism

Pointing the finger

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From The Economist print edition

A CHILD'S future really may be written in his hands—not in the creases of his palms but in the relative lengths of his fingers. A report just published in *Developmental Medicine and Child Neurology* suggests that people with autism have ring fingers that are abnormally long compared with their index fingers.

Children with autism have trouble interacting with other people. Both their verbal and their gesture-based communication is poor, and they often have low intelligence. Early hallmarks—a failure to point at things, follow the gaze of someone else, or engage in pretend play—are often obvious by the tender age of 18 months. About one child in 500 suffers from the condition.

John Manning, a researcher at the University of Liverpool, in Britain, who has studied what fingers can indicate about everything from fertility to sexual preference, teamed up with Simon Baron-Cohen at the University of Cambridge, whose expertise is in autism. They studied 72 autistic children and 23 with Asperger's syndrome, a related condition in which the individual's intelligence is not affected.

Dr Manning and Dr Baron-Cohen photocopied the children's hands, and carefully measured the lengths of their subjects' fingers from the copies. They worked out the ratio of the length of the index finger to the length of the ring finger for each child, and compared it with those of 34 of the children's healthy siblings, 88 of their fathers, 88 of their mothers, and a number of unrelated controls that were matched for sex and age.

The relative sizes of someone's fingers are fixed for life within three months of conception, and the relationship seems to be governed by testosterone. Although the reason is not yet understood, earlier studies have shown that finger-length ratios are a robust marker of how much of that hormone a baby has been exposed to *in utero*—the more testosterone, the longer the ring finger. Overall, therefore, men tend to have longer ring fingers than index fingers, whereas in women the two fingers are more likely to be of equal length.

Dr Manning and Dr Baron-Cohen found that autistic children had extremely long ring fingers compared with their index fingers. Children with Asperger's also had abnormal index-to-ring finger ratios, though less so than full-blown autistics. Even the unaffected siblings and parents of the autistic children had ratios that differed significantly from the normal controls.

That may sound surprising, but high levels of testosterone in the womb have been linked to several other brain-related phenomena, including left-handedness, dyslexia and female homosexuality. Dr Manning thinks that the families of autistic children are genetically predisposed to produce high levels of testosterone during early development. (The fetus makes most of the testosterone itself. In males, it comes from the testes and adrenal glands; in females from the adrenals alone. Only a small amount, if any, comes from the mother.)

While high levels of testosterone may not solve the whole puzzle of autism, Dr Manning thinks levels *in utero* may be an important piece of it. The finding bolsters what is known as the "extreme male brain" theory of autism. As the name suggests, autism—which is, in any case, much more common in men than women—may simply be an extreme magnification of traits, such as problems with communication and empathy, that psychological testing has shown (to the surprise of few women) are more frequently found in men.

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Astronomy

Dark secrets

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From The Economist print edition

THE thing about dark matter is that it is dark. So finding it is difficult. It is like locating a pair of black socks inside a drawer on a winter's morning—the bright socks are easier to see. Astronomers are faced with the similarly frustrating problem of finding dark objects in a dark universe. But they know there is something out there, because the universe is heavier than it appears. The stars at the edge of the earth's home galaxy, the Milky Way, for example, are moving so fast that they ought to have escaped altogether. Adding up how much the visible Milky Way weighs gives a figure that is barely a twentieth of the amount necessary to explain why those stars remain trapped by the galaxy's gravity. So, instead, astronomers suspect that there must be a lot of heavy and undetected matter lurking somewhere in the back of the galactic sock-drawer.

They have been searching for this missing matter for 70 years, and there are two main ideas about what it might be. One is that it consists of familiar objects, such as stars, that are too faint to detect. The other is that it is made of exotic particles that neither emit light nor interact with the more familiar forms of matter, and so are hard to observe. A paper just published in *Science* by Ben Oppenheimer of the University of California, Berkeley, and his colleagues, suggests that the former idea is at least partly correct. Some of the missing mass—perhaps as much as a third of it—is merely very old stars, known as "ultracool white dwarfs".

A white dwarf is what becomes of a star when it is so old it no longer produces energy by nuclear fusion. Ultracool white dwarfs have cooled to below about 4,000°C (the centre of the sun, by contrast is more than 15m°C). At this temperature, the hydrogen atoms inside the stars start to pair up. As a result, their starlight becomes characteristically bluer. So, although ultracool white dwarfs are hard to see, they are easy to recognise once spotted. And Dr Oppenheimer has spotted them in an area of the Milky Way known as the halo.

The bright bits of spiral galaxies such as the Milky Way are discs. Closer inspection, however, reveals that these discs are surrounded by spherical stellar halos. Such stars as are visible in a halo are sparsely but uniformly scattered throughout it. They are also very old—like ultracool white dwarfs.

The team used a detailed survey of a portion of the nearby sky to search for potential ultracool white dwarfs in the Milky Way's halo. It looked for stars that had unusual orbits around the galactic centre—those that moved faster than normal stars, followed non-circular trajectories, or moved at an angle to the disc. All of these things are characteristic of halo stars. From the list of stellar oddities that the researchers found, they identified the true ultracool white dwarfs by their blue light. Of 92 probable halo stars, the team obtained spectra for 69—of which 34 turned out to be ultracool white dwarfs.

By extrapolating what they found in the portion of the sky that they surveyed to the whole of the galaxy, Dr Oppenheimer and his team reckon that ultracool white dwarfs contribute a minimum of 3% of its dark matter. That may not seem huge, but it is actually quite significant. Even 3% of the suspected dark matter adds up to something close to the mass of previously visible stars in the Milky Way (the balance of the visible matter consists of clouds of gas and dust). Moreover, the researchers know that their method is biased, because it is able to detect only stars above a given faintness and travelling below a certain speed. So there are, potentially, many more ultracool white dwarfs out there.

Exactly how many more, nobody is really sure, but there are some clues. Other work on so-called "massive compact halo objects" (MACHOs—a fancy name for invisible stars) suggests they may represent 35% of the dark matter. Dr Oppenheimer's work hints that almost all these MACHOs could actually be weedy white dwarfs.

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Of pimps, punters and equities

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Is it Wall Street's history or modern financial theory that best explains how stockmarkets work? Or neither?

THE greatest-ever bull market in equities seems to be at an end. The Nasdaq is in free fall; the Dow, having trodden water for a couple of years, also shows signs of sinking. Stockmarkets in the rest of the world are following America's lead. It is not too early to ask questions, and not just "Why didn't I sell Cisco a year ago?" How about, "Do we really know anything about how stockmarkets value shares?"

TOWARD RATIONAL EXUBERANCE: THE EVOLUTION OF THE MODERN STOCK MARKET
By B. Mark Smith

Farrar, Straus & Giroux; 304 pages; $25

Buy it at
Amazon.com
Amazon.co.uk

The answer is not really, for all the efforts to argue the contrary by the unfortunately timed—or titled—"Toward Rational Exuberance". Mark Smith, a veteran share trader with CSFB and Goldman Sachs, believes that the stockmarket, at least in America, has become increasingly rational over the past century, a case he makes by cleverly intertwining the unfolding academic debate about how to value equities with a colourful history of Wall Street's evolution (if that is the right word).

The crash of 1929 was clearly a turning-point, dashing enthusiasm for buying shares for a generation. It discredited economic scholars who argued that even at the peak of the market, shares were fairly valued because company profits were higher and new technology was leading to greater productivity and faster economic growth. Mr Smith mounts a stout defence of Irving Fisher, a Yale economist who famously said that share prices had reached a "permanently high plateau" just before they fell off it. Profits were indeed accelerating. At the peak of the market, the average ratio of share price to profits was 16—unprecedented then, but average for the past 50 years and modest today, despite recent share-price tumbles. Evidently, there was no speculative bubble; stocks were not badly overvalued.

Nor did the crash of 1929 lead to the Great Depression that followed, says Mr Smith, which may be comforting for those who fear that the recent Nasdaq crash could have similar consequences. The depression was caused rather by the mistakes of the Federal Reserve, which, of course, do not happen under its current chairman, Alan Greenspan. In Mr Smith's view, the crash could not have occurred because investors suddenly came to fear a depression as they had no reason to expect the Fed's errors.

So why did it happen? Fisher blamed the "psychology of panic", saying: "It went down because it went down." Mr Smith is generally sceptical about such behavioural explanations. His book's title is a clear riposte to one of last year's bestsellers, "Irrational Exuberance", by Robert Shiller, another Yale economist and a leading practitioner of behavioural finance, which attempts to find psychological explanations for otherwise mystifying movements in the stockmarket.

Behavioural finance is the commonest rival to a widely accepted theory which helped transform the investment business during the second half of the 20th century. This is modern finance theory, which is

built on the belief that the market is “efficient”, in the sense that prices incorporate all available information. That makes future changes in prices unpredictable, which means that the only investors who consistently outperform a market average are either taking bigger risks or are simply lucky. According to the finance theory, diversification is the best investment strategy and much Wall Street research is worthless.

The stockmarket crash of 1987 appeared to disprove the efficient-market theory, as it seemed to occur without any reason. (Analysts’ failure to predict it seemed to underline the theory’s message about the value of Wall Street research, however.) The Dow fell by 23% on a day when there was no news.

Since then, behaviouralists have been making the running in academic finance. Numerous so-called anomalies have been discovered, evidence that suggests the market can be beaten after all. The most famous was the January effect, according to which shares did better in January than in other months. As Mr Smith observes, many of these anomalies seem to vanish soon after they are publicised, which suggests the market is pretty efficient at correcting its inefficiencies. More fundamentally, the behaviouralists have yet to come up with a coherent model that actually predicts the future, rather than merely explaining, with the benefit of hindsight, what the market did in the past.

The current bear market seems to vindicate behaviouralists who argue that there has been a huge stockmarket bubble. But it also suggests that the stockmarket is efficient—or at least exhibits one consequence of efficiency: unpredictability. Sadly, it is impossible to settle the issue either way. When it comes to indisputable facts in finance, it is hard to improve on the answer provided by J. Pierpont Morgan. When asked what the market would do, the Titan replied simply, “It will fluctuate.”

Mr Smith overlooked another history lesson, perhaps because of his association with two of Wall Street’s top investment houses and equity brokers. If you think of how persistently investors have been sold overvalued shares in recent years, he might have agreed with a famous Wall Street bear in the 1920s, Jesse Livermore, who described Wall Street as a “giant whorehouse”, where brokers were “pimps” and stocks “whores”, and where customers queued to throw their money away. *Plus ça change*.

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History of science

A magic brew

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From The Economist print edition

THE QUEEN'S CONJUROR: THE SCIENCE AND MAGIC OF DR DEE.
By Benjamin Woolley.
Henry Holt; 410 pages; $25.
HarperCollins; £15.99

WHAT is the relationship between science and magic? The two were once closely linked: such eminent researchers as Tycho Brahe, Nicolaus Copernicus and Johannes Kepler all dabbled in astrology and other mystical activities alongside their more orthodox scientific pursuits. The late 16th century was a time of upheaval—cosmology was being redefined, the new world colonised, new stars and comets were appearing in the sky—and the search for knowledge took many forms. The astronomers who confirmed a supernova in the constellation Cassiopeia also pondered its astrological meaning. It is in this context, argues Benjamin Woolley, that the occult activities of John Dee, a mathematician, philosopher and adviser to Queen Elizabeth I, should be seen. Rather than unscientific, Dee's seances with angels and spirits were one of the many ways he tried to fathom the secrets of the universe.

The Queen's Conjuror

Something new under Cassiopeia

Dee's thirst for knowledge drove him to assemble one of the finest libraries in Europe, and throughout his life he nurtured the dream of establishing what would today be termed a research institute. His wide-ranging expertise meant he was regarded as an authority on matters ranging from calendar reform to navigation, cartography and the likelihood of the existence of the fabled north-west passage to China. He was also learned in cryptography, astronomy and the nascent science of optics. (That said, Mr Woolley slightly overdoes his claim that Dee prefigured work done later by Galileo and Newton.) But from his undergraduate days at Cambridge, when he staged a play whose impressive special effects were attributed to black magic, Dee was stalked by the accusation that he was meddling with diabolical forces. Which, indeed, he was.

For much of his life Dee conducted seances or "actions" in which he communicated with the spirit world through a medium, or "skryer", who spoke on their behalf. Dee's most gifted skryer was a mysterious young man called Edward Kelley, through whom Dee variously attempted to discover the location of buried treasure, the secrets of the original language spoken by Adam in the garden of Eden, and clues to the future course of European politics.

Because of his boundless curiosities, and because he moved between the worlds of science, mysticism, religion, politics and espionage, Dee proves an ideal character around whom to tell a number of intriguing stories. His fortunes rose and fell precipitously during his career; he went from being penniless to being a valued royal counsellor and back again several times, and was imprisoned, denounced and deceived for his pains along the way.

Mr Woolley paints a subtle and sympathetic portrait of his subject, siding neither with the "hard-headed rationalists" who dismiss Dee as a fool, nor with the "muddle-headed mystics" who regard him as a Merlin-like wizard or an English Nostradamus. It is a shame that Dee was not born a century later, as he would have thrived in the scientific revolution. After all, Mr Woolley argues, Dee's main interest was magic, which is traditionally divided into natural magic (obeying natural laws) and supernatural magic (involving supernatural forces). The word "magic", in other words, is a term which includes understanding the world and exploiting that understanding. The modern term for this is science.

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Historical biography

Our man in the middle

Mar 22nd 2001
From The Economist print edition

TO BE remembered by posterity, after a long career in public service, solely as a cuckold is indeed hard. Such has been the fate of Sir William Hamilton, husband of Nelson's mistress, Emma. To find out what sort of man he was, and to approach the renowned *ménage à trois* from the third angle, have been the aims of David Constantine in this biography.

FIELDS OF FIRE: A LIFE OF SIR WILLIAM HAMILTON
By David Constantine

Weidenfeld & Nicolson; 352 pages; £20

Buy it at
Amazon.co.uk

Of the 72 years of Hamilton's life, 35 were spent in Naples as British envoy. He was there, apart from a few breaks, from 1764 to 1799. His time on post therefore encompassed the American declaration of independence, the French revolution and two eruptions of Vesuvius. The king of Naples, Ferdinand IV, the son of the Spanish king, was married to Maria Carolina, the sister of Marie Antoinette. The turbulence in France and elsewhere gradually had its repercussions in Naples, which earlier had had about it "an indolence...and an anarchic energy and ebullience".

Hamilton had lobbied for this particular job because of the indifferent health of his first wife, Catherine. She appeared to suffer more from a nervous than a physical disorder, but, whatever it was, the climate in Naples suited her, and the couple had a companionable time there until her death at the age of 44.

Hamilton's passions were volcanoes and vases. He loved the thrill of standing at the edge of Vesuvius's bubbling crater, writing detailed descriptions that were later gladly received by the Royal Society in London. He collected an enormous quantity of Etruscan vases and became a connoisseur of the Greek mythology portrayed on them. Many ended up in the British Museum, while reproductions were turned out by Josiah Wedgwood in his new factory. Hamilton was good company and a generous host to his many visitors.

Emma Hart entered his life when he was 53 and she was 21. She was palmed off on Hamilton by her previous lover, Sir William's nephew, Charles Greville, who wanted to be shot of her in order to marry an heiress. Emma was neither well-born nor well thought of: she had been a prostitute. But her great beauty and considerable character ensured that she divided opinion in society wherever she went.

Against the odds, her marriage to Hamilton was remarkably successful and they were happy together in Naples. Even after the advent of Nelson and the huge scandal caused by the flaunting of his affair with Emma, Hamilton seems to have remained content. Whether he was simply blind to the situation or, more probably, complaisant, his amiable nature seems to have coped with it somehow. The three of them travelled together, shared a house, and divided bills scrupulously.

David Constantine, a reviewer in these pages, gives a sympathetic picture of an intelligent man, a connoisseur of antiquities, whose life slowly unravelled through his proximity to the unedifying court of the "poltroon" King Ferdinand and through the disgrace of his second wife. He spent his last few years in England living with Emma and Nelson, ill, shunned and in debt. This excellent biography, clear and amusing, restores some if not all of Hamilton's dignity.

KATE GRIMOND

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Modern poets

Hold the politics

Mar 22nd 2001
From The Economist print edition

T.S. ELIOT (1888-1965) is proving difficult to dislodge. Although it is common to regard him as politically and ideologically objectionable (he was, after all, a Dead White Male even while he lived), and despite attacks on him for his supposed anti-semitism, his reputation as a poet remains essentially intact. Indeed, in this reviewer's experience a genuine love for Eliot's verse is an international phenomenon second only to the love for Shakespeare. When a group of students at the University of Baghdad was recently asked whom they considered to be the greatest "modern" writer, they answered: "The man who died in 1965", after which they swapped quotations with an ease obviously born of devotion.

WORDS ALONE: THE POET T.S. ELIOT
By Denis Donoghue

Yale; 342 pages; $26.95 and £17.95

Buy it at
Amazon.com
Amazon.co.uk

Denis Donoghue, a professor of English and American literature at New York University, does not specifically set out to defend Eliot against recent onslaughts, although he does do so, and it is apparent that he usually has them at the back of his mind. But "Words Alone" is not simply a successful attempt at a fresh survey of the most minutely scrutinised poet in English of the 20th century, for it aims to restore to readers the sense that they should—as readers did in the last century—"submit" to Eliot as a master of language.

Mr Donoghue's testimony to his own submission partly takes the form of spiritual-intellectual autobiography. After a relatively late discovery of Eliot, at University College, Dublin, Mr Donoghue's maturation as a reader of poetry was also the maturing of his understanding of Eliot. In fact, his struggle with Eliot is also a struggle to grasp what language can do.

The heart of the book is Mr Donoghue's re-assessment of the doctrine of Symbolism via an exceptionally fine reading of "La Figlia che Piange". He delineates two different sorts of symbolism. One is French in origin and prizes richness and ambiguity. It feels affinity with dreams yet resists the sort of interpretive canons that Freud devised for them. The other is the symbolism of transparent, bright images that are logical and which form a pellucid part of an exfoliating narrative—the symbolism of Flaubert and of the Joyce of "Ulysses". (You could add to the latter Dante, interpreted, in effect, as a symbolist poet by Eliot.)

Eliot's symbolism is mostly of the first kind, and allows him to detect what is uncanny, uninterpretable, suggestive of "feelings into which we cannot peer", in the language of his literary predecessors. It also gives him purchase on the language of those who are no one in particular—like the woman in the pub who speaks with obscure menace about Lil in "The Waste Land". This is a feeling for the beginnings of language—what Eliot called "auditory imagination" and what Thomas Mann, talking of Wagner's use of an e-flat major chord to symbolise the birth of consciousness at the beginning of "Das Rheingold", called an "acoustic idea".

The title of Mr Donoghue's book, "Words Alone", refers to the work a language must do when deprived of normal syntax, and hence of transparent logical relations:

> There, the eyes are
> Sunlight on a broken column
> There, is a tree swinging
> And voices are
> In the wind's singing
> More distant and more solemn
> Than a fading star.

Mr Donoghue's beautifully acute reading of "The Hollow Men", from which the lines just quoted come, is a fine demonstration of the point. The other side of this sort of symbolism is that it is possible for the writer to suggest a development and even an ideal completion of experience that cannot yet be put into words.

Mr Donoghue appeals to that possibility to defend those prose writings—notably “The Idea of a Christian Society”—where Eliot is so obviously gesturing towards what cannot be significantly imagined that some have charged him with pure irrelevance. Mr Donoghue argues that this use of language intimates an ideal that “might if nothing else enrich the reverberation of our lives”.

If that sounds too sceptical a conclusion for an avowed Christian such as Mr Donoghue, readers might remember that Eliot was one of the 20th-century’s more sceptical writers, despite his well-publicised religious and political loyalties. Eliot’s status as a “master of language” flowed from this scepticism, from his almost hallucinatory sense of what language could and could not do, of what comes before and after it. The only poet since Shakespeare who competes with Eliot in that is Tennyson.

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What the world is reading

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THE current Israeli bestseller lists are wonderfully eclectic, suggesting a highly inquisitive readership with wide-ranging interests. Homegrown talent dominates the fiction list, with few novels in translation (all the books listed are in Hebrew, but Israeli publishers also give titles in English). True, the latest John Grisham is in there too; but the list is otherwise free of the big international names that one might expect to find. Jewish history and identity are themes which recur in several of these novels, including Dov Elbaum's "My Life with the Patriarchs", a loosely autobiographical fantasy which locates the biblical forefathers in modern Israel. Israeli readers' taste in non-fiction, is, if anything, still more adventurous, taking in everything from Fermat to Catherine the Great, Stalingrad to Singapore, reincarnation to cognitive psychology.

Set alongside this, the American lists present a number of contrasts—as well as some underlying similarities. The fiction list divides up into six thrillers and three family dramas, plus "The Painted House", John Grisham's first non-legal non-thriller. The popularity of Terry McMillan's "A Day Late and a Dollar Short", which explores the dynamics of an African-American family, and "The Bonesetter's Daughter", the latest offering from Amy Tan, an acclaimed Chinese-American novelist, bespeaks a nation of readers as curious about their history and evolving identity as their Israeli counterparts. Non-fiction-wise, though, there is little change: "Body for Life" and "The O'Reilly Factor" simply will not move—not to mention Spencer Johnson's "Cheese". Newcomers include Bruce Wilkinson's "The Prayer of Jabez", a self-help book with a biblical flavour, and the autobiography of Dave Longaberger, a businessman who rose from humble origins to make millions selling baskets.

Bestsellers

	ISRAELI FICTION	AMERICAN FICTION
1	Blindness *by Jose Saramago* A society afflicted by blindness	1st to Die *by James Patterson* Gruesome thriller
2	Quench Love *by Yochi Brandes* West Bank love story with biblical overtones	A Painted House *by John Grisham* Non-legal non-thriller
3	Badulina *by Gabi Nitzan* Modern-day fairy-tale for grown-ups	Scarlet Feather *by Maeve Binchy* Irish family drama
4	A Painted House *by John Grisham* Non-legal non-thriller	The Bonesetter's Daughter *by Amy Tan* Chinese-American family drama
5	Everlasting Life *by Eyal Megged* Theological and erotic novel set in Israel and Cuba	A Day Late and a Dollar Short *by Terry McMillan* African-American family drama
6	Laundry *by Susan Adam* Growing up in Transylvania and Israel	Edge of Danger *by Jack Higgins* Political thriller
7	My Life with the Patriarchs *by Dov Elbaum* Autobiographical fantasy	The First Counsel *by Brad Meltzer* Legal thriller
8	Landscape with Three Trees *by Joshua Kenaz* Two slice-of-life novellas	The Vendetta Defense *by Lisa Scottoline* Vengeful thriller
9	Four Men and a Woman *by Shulamit Gilboa* Coming of age story with much steamy sex	Mystic River *by Dennis Lehane* Psychological thriller
10	Someone to Run With *by David Grossman* Young love, plus drugs and a dog	A Darkness More Than Night *by Michael Connelly* Serial-killer thriller

	ISRAELI NON-FICTION	AMERICAN NON-FICTION
1	Fermat's Last Theorem *by Simon Singh* History of a mathematical mystery	Who Moved My Cheese? *by Spencer Johnson* Million-selling self-help book
2	Stalingrad *by Antony Beevor* Decisive battle of the second world war	The Wisdom of Menopause *by Christiane Northrup* Coping with the change
3	Catherine the Great *by Henri Troyat* Biography of the infamous empress	The Prayer of Jabez *by Bruce Wilkinson* How to live a blessed life
4	Reincarnation *by Yigal Arica* Who were you in your previous life?	Body for Life *by Bill Phillips* Three months to total health
5	Your Honour *by Nomi Levitsky* Biography of Israel's Chief Justice, Aharon Barak	Secrets of the Baby Whisperer *by Tracy Hogg* Communicating with your baby
6	Singaporean Riddle *by Gabriel Weimann and Baruch Nevo* Secrets of the city-state's success	The O'Reilly Factor *by Bill O'Reilly* Reflections of a TV anchorman
7	Nietzsche *by Jürgen Nieraad and Ilana Hammerman* Selected texts in translation	Life Makeovers *by Cheryl Richardson* Self-improvement tips
8	Flotilla II *by Mike Eldar* Israeli derring-do on the high seas	Ice Bound *by Jerri Nielsen* Author's battle with cancer
9	Under the Tuscan Sun *by Frances Mayes* Setting up in Italy	Tuesdays with Morrie *by Mitch Albom* Dying man's wisdom
10	The Thinking Dwarf *by Nitza Eyal* Cognitive psychology	Longaberger *by Dave Longaberger* Dave's success story

Sources: *Ha'aretz Book Review; Publishers Weekly* Book descriptions by *The Economist*

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Poet in stone and steel

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John Szarkowski

LOUIS SULLIVAN (1856-1924) was the doyen of Chicago architecture during the boom of the early 1890s when new steel-frame construction altered the profiles of mid-western cities by pushing them up rather than out. In many architectural histories Sullivan is included as the proto-modernist who coined the one-liner, “form ever follows function”. But Sullivan’s own view of his work was much richer than this cryptic slogan suggests. Far from rejecting expressive motifs, he endowed his skyscraper façades with surging, organic life that he took to signify both the creative essence of nature’s will and the democratic impulses which he deemed natural to man.

In Sullivan’s day, American architectural studies were dominated by the French Beaux-Arts tradition, and particularly by Viollet-le-Duc’s romantic rationalism. Students were taught that architecture should display its essence by making a building’s purpose, materials and relation to gravity completely clear. History was full of useful examples, but in the prevailing atmosphere of anti-classicism, the Gothic mode was preferred. Although this teaching lacked the heroic content Sullivan felt architecture required, he did draw from it his famous dictum about form and function. The phrase became a battle cry for modernists such as his one-time draughtsman, Frank Lloyd Wright. Some even took the phrase to mean that all ornamentation was redundant. And, indeed, the ornate façade of Sullivan’s own favourite, the Bayard-Condit building on Bleeker Street in New York, does make you wonder what its exuberant, floral curlicues are for.

Function, of course, means many things. A steel girder functions to support a skyscraper. And an architect has ways to show us, if he wants, how that girder is at work. This is the sense of function inherited from Viollet-le-Duc and taken to heart by the modernists. Then again, for practical reasons, buildings need to announce their function as, say, schools or museums. But Sullivan, who saw himself as an artist in touch with nature, had a third idea of function. To the romantic rationalism of Paris, he added the transcendental longings of Whitman and Emerson. Architecture’s highest calling for Sullivan was to put man back in touch with his democratic instincts and the cosmic forces of nature.

Sullivan’s exalted view of the profession, not to mention his difficult personality, led to quarrels with clients and partners, and after the bust of 1893 his Chicago practice never recovered. Living on the charity of friends, Sullivan had to seek humbler work in the provinces. His two-storey brick banks with their complex ornamentation for mid-western farming towns are, nevertheless, a brilliant culmination of his career.

These three handsome books help us to appreciate Sullivan’s architecture and the thinking behind it afresh. The new edition of John Szarkowski’s 1956 photographic study is a beautiful portrait of the works. Richard Twombly and Narciso Menocal explore Sullivan’s ideas about the poetics of architecture in his late writings and offer up a visual feast of his drawings. David Van Zanten examines the buildings in the light of Sullivan’s unswerving conviction that his profession was fundamentally artistic.

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Controlling the Internet

Web phobia

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From The Economist print edition

REPUBLIC.COM
By Cass Sunstein

Princeton University Press; 224 pages; $19.95 and £12.95

Buy it at
Amazon.com
Amazon.co.uk

BAD books can be interesting, not for what they say but for what they represent. Cass Sunstein's "republic.com" is a prime example. Mr Sunstein, a professor at the University of Chicago Law School, is the author of many incisive books. But here he seems to have completely lost his way.

Mr Sunstein's thesis is that the Internet will lead to a fragmentation of political discourse in America so severe that it will undermine American democracy. He is particularly exercised by "filtering" technology, which allows people automatically to select news and entertainment on specific subjects, and the proliferation of special-interest websites. He cites studies which purport to show that like-minded groups have a natural inclination to move to extremes, and he frets that the Internet will destroy the "public forum" where people bump into views they do not share.

Certainly, the Internet contains many special-interest sites and thousands of so-called "hate" sites. But it has also vastly increased the amount of information available to the ordinary person, who now has access to millions of public documents, academic papers, think-tank reports, scientific studies and political speeches which in pre-Internet days (a mere five or six years ago) only small numbers of people could easily obtain. And by far the most popular Internet sites are the mainstream news sites of established broadcasters, newspapers and magazines. This seems to indicate that most Internet users continue to want the broad intermediaries which Mr Sunstein claims are so essential to maintaining democratic debate.

Moreover, the Internet did not create special interests, as any newsstand confirms. Ever since mass printing, there have been specialist publications, from *Knitting Monthly* on. And most people "filter" all the time, whether they get their information from the media or from whom they meet on the street. Everyone knows people who only read the sports pages, or who cannot name their state's senator. They don't need fancy software to do that.

Mr Sunstein concedes all this, and yet he still lies awake at night worrying that the Internet is a threat to democracy. His solutions to this grave danger? "Voluntary" codes of conduct requiring partisan web-sites to link to their political opponents, enforced "disclosure" of how much big websites are doing to promote the public interest, and a government-subsidised website "Public.net", where "serious" debate can be protected from the encroachments of infotainment and narrow-mindedness.

These are far more intrusive and illiberal suggestions than Mr Sunstein seems to realise. And they are completely unnecessary and possibly damaging, at a time when the universe of available information is exploding. As Mr Sunstein is evidently a sincere and sensible democrat, there must be something that explains his alarm. So far the Internet has proved more of a democrat's dream than a nightmare. In part this is because it challenges monopolies on easy access to expert information that professional groups—including even law professors—have enjoyed. Might that threat be what Mr Sunstein really finds so

worrying?

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America's Jews and Israel

Push and pull

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AMERICANS have an understandable inclination to prefer friendly democratic Israel to its moody undemocratic Arab neighbours. But for a span of time, roughly from the late 1960s until the mid-1980s, most of America's Jews believed it their duty to enhance that preference by all means at their disposal. And they thought that they should do so regardless of any private criticism of Israeli policy. Such reservations, they were told by their spearhead lobbies, were irrelevant. It was not up to American Jews to criticise Israel. Their job was to assure the American government's continuous and generous support of the Jewish state by making certain that legislators well-disposed towards Israel were duly elected.

IRRECONCILABLE DIFFERENCES? THE WANING OF THE AMERICAN JEWISH LOVE AFFAIR WITH ISRAEL
By Steven T. Rosenthal

Available in Britain in June, from Plymbridge; £21 Brandeis/University Press of New England; 248 pages; $24.95.

Buy it at
Amazon.com
Amazon.co.uk
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Amazon.co.uk

Rightly or wrongly, America's Jews thereby gained a fearsome reputation as the makers and breakers of political careers. The reputation was exaggerated, but politicians had some reason to run scared. Charles Percy, for instance, a respected Republican senator for Illinois, lost his seat in 1984 to a challenger heavily backed by American-Jewish constituents. One of Mr Percy's sins was to label a bid to move America's embassy from Tel Aviv to Jerusalem "wrong, wrong, wrong". A few years earlier, pressure from American-Jewish groups had helped to force the resignation of Andrew Young, America's ambassador to the UN, after Mr Young, against the rules, talked to the Palestine Liberation Organisation's man. A baffled world saw a superpower paying extraordinary deference to a small, controversial nation.

Steven Rosenthal, a history professor at the University of Hartford in Connecticut, explains how American Jewry's uncritical approach to Israel took hold. Guilt played its part. Fears about dual loyalty, so he argues, had been largely put to rest, in pre-state years, by Louis Brandeis, a Zionist and a great justice of the Supreme Court. But in 1951, David Ben-Gurion, Israel's first prime minister, called for *aliya*: emigration to Israel was essential, he declared, for anyone who considered himself a Zionist. American Jews were startled, and did not respond: between 1948 and 1967, only 10,000 of them emigrated to Israel.

They preferred to stay. But they made up for it, says Mr Rosenthal, by giving Israel unequivocal backing, particularly after its triumphs in the 1967 war, when the Jewish state could be portrayed as a powerful ally rather than a moral cause. Anything and everything done by successive Israeli governments was defended. Dissenters were frowned on, even when they happened to be Israelis. For instance, the senior reserve officers who formed Peace Now after the 1973 war found it hard to get an American-Jewish hearing. It was, writes Mr Rosenthal, "as if American Jews had expended so much psychological energy on Israel that its being subject to human error was a possibility too fearful to contemplate."

This could not last. Slowly, during the 1980s, blotches appeared on Israel's face. Its invasion of Lebanon and the bombing of Beirut caused a certain questioning. But this was nothing compared with the American soul-searching after Jonathan Pollard, an American-Jewish analyst in the navy, was arrested in 1985 for spying for Israel. The Israelis thought they could get away with this as they had with so much else: they felt themselves a Teflon nation at a time of Ronald Reagan's Teflon presidency. But Mr Pollard reawakened those dual-loyalty fears: the spy was a turncoat whose loyalty to Israel caused him to betray his native country. And even worse was to follow: American Jews found themselves involved in the long, complex "Who is a Jew?" controversy, in which Israel's Orthodox rabbis appeared to seek to delegitimise America's Reform and Conservative following.

By 1991 George Bush senior was able to brave the protests of a fragmented Jewish community when he refused to grant Israel urgently needed loan guarantees because the government of the time would not suspend settlement-building. Such toughness, in the face of American Jewry, had not been seen since 1956, when Israel was pushed back from the Suez Canal after American pressure halted the Anglo-French-Israeli operation against Egypt. With the end of the cold war, the American-Jewish consensus on Israeli sanctity was gone, it seemed for ever.

Nowadays, American-Jewish divisions on the Israeli-Arab peace process reflect Israel's own. But the noise comes mostly from the right. The hardliners may amount, writes Mr Rosenthal, to no more than 10% of American Jews but they make up for this with volume and vehemence. Some of their lobbies are influential: in 1998, 81 senators were persuaded to sign a letter supporting Binyamin Netanyahu's government against an American peace plan. Many independent newspapers, including this one, hear from them with deadening repetitiveness. And they have carried the battle to Israel itself: some 15% of West Bank settlers, including the most radical, are from America.

Dedicated hardline settlers are one of the great obstacles to an Israeli-Palestinian peace. But Mr Rosenthal finds even more to regret in the growing coolness between Israel and the rest of American Jewry—a recent poll found that only 58% of Jewish Americans feel themselves close to Israel, a decline of 17 percentage points in ten years. He argues that identification with Israel, and the sense of communal obligation, acted as a bulwark against American-Jewish assimilation. Perhaps he can take a grain of comfort from the latest events. As most of the world condemns Israel for using excessive force against the Palestinian *intifada*, there have been signs that American Jews are once again circling the wagons.

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Modern pianists

Carved in ivory

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THE life and career of Sviatoslav Richter almost exactly paralleled that of the Soviet Union. Born in the Ukraine in 1915, he died in 1997. His grandfather was German and throughout his youth and during the second world war Russians considered him German, while the Germans thought of him as Russian. Regarded as one of the greatest pianists of the 20th century, Richter was a mysterious, eccentric figure.

SVIATOSLAV RICHTER: NOTEBOOKS AND CONVERSATIONS
By Bruno Monsaingeon (translated by Stewart Spencer)

Princeton University Press; 464 pages; $29.95.
Faber and Faber; £25

Buy it at
Amazon.com
Amazon.co.uk

Bruno Monsaingeon met him in the 1980s, when he was working on a documentary about Glenn Gould, a celebrated Canadian pianist, whose eccentricities made Richter seem quite humdrum. Gould asked Mr Monsaingeon to try and set up a recording session with Richter. Knowing Gould's reclusiveness, Richter agreed but only on condition that Gould would come and give a public concert at Richter's music festival in France—the Fêtes Musicales de Touraine, which he founded in 1964. Predictably, the recording and concert never took place.

Some years later Mr Monsaingeon approached Richter about making a film. A friendship began and Richter asked him to write his biography. The book has three parts: a brief opening in which Mr Monsaingeon describes their work together, then nine chapters, the result of their tape-recorded conversations, which he has made into a first-person narrative; and last—for those interested in music this will be the most rewarding part of the book—Richter's diary of performances and recordings in which he notes his own reactions and impressions of other performers. Though most of the entries are brief, they are vivid in their immediacy, and Richter's remarks about opera productions, conductors (he despised Herbert von Karajan and thought that Carlos Kleiber was the greatest) and individual works are constantly engaging. An appendix lists his recordings, with dates and locations.

Richter's eccentricity was perhaps a mixture of the manic-depression from which he intermittently suffered and his stratagems for surviving the horrors of terror and war. Richter's father was arrested and executed in 1942, and for many years he believed his mother had died—they met again only in 1961. He was followed and harassed, but was eventually judged such an important Soviet artist that he was allowed to travel and live part of the year abroad. He seems never to have considered deserting Russia. Near the end of his life he refused to perform without the score. His insistence on the "uselessness" of memorising music and on the need for pianists to make do with the instrument at hand make interesting contrasts to the views of other famous recitalists.

Mr Monsaingeon has a somewhat starry-eyed view of Richter "the genius" or "the maestro", as he refers to him. But in allowing Richter's own words to take precedence over anecdotes or analysis, a clear view of Richter's musical life emerges. Apart from his memories of childhood, there is little about his personal life, and the rumours of his homosexuality and alcoholism are kept hidden. There are many photographs, which tell their own story, as Richter develops from a mischievous-looking young man to the chiselled, inscrutable icon of his later years.

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Allen Kneese

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Allen Victor Kneese, defender of the environment, died on March 14th, aged 70

Photo courtesy of Volvo Environment Prize

SOMETIMES Allen Kneese would remark, in case anyone had forgotten, that air and water used to be thought of as "free goods". They were regarded as sinks of infinite capacity that could swallow waste, however disgusting, without causing harm. Nowadays, of course, everyone claims to be an environmentalist intent on exposing the villains who are ruining the planet. But who are the villains, and can they reform? Mr Kneese was deeply suspicious of policymakers in the United States whose impulse was for central planning and direct regulation to tackle pollution. This approach was clumsy and produced "the familiar field days for lawyers, heavy costs, a huge bureaucracy" and "far-reaching intrusion by government". There had to be a better way.

Mr Kneese was a pioneer in what came to be called environmental economics. He showed that "waste" could have a value that had been neglected because producers have been encouraged to use virgin materials on a large scale. This was seen as the way to rapid economic growth. In the United States there were subsidies, often in the form of tax cuts, that favoured the exploitation of mineral and energy products. These subsidies kept prices of manufactured goods lower than they otherwise would be, and discouraged the use of recycled materials. "Recycling" is a big idea today. If it has an inventor, Mr Kneese would be a claimant.

Perhaps the other big idea to get producers to cut pollution without closing them down is "green taxes". Mr Kneese called them "fees" and he designed a calculation that would reduce pollution to an acceptable level. The calculation was imperfect, he said. How, for example, did you take account of recreational losses as the result of a polluted river? But it broadly works. Mr Kneese also wanted polluters to have freedom to reform themselves. His proposal to allow firms, for example chemical plants, to trade pollution "allowances" as long as the total limit of pollution was not exceeded, became law in the United States in 1990. Not everyone approved of his approach. He was called a crackpot academic providing manufacturers with a licence to pollute. Not surprisingly, he sometimes became dismayed with his fellow Americans.

With the wild horses

Allen Kneese was born on a ranch in Fredericksburg, Texas. His first school, he recalled, was a one-room affair built by his father. It had three pupils and the teacher had another job taming wild horses. Fredericksburg had been first settled in the 19th century by German immigrants who called themselves "free-thinkers". It signed a peace treaty with the Comanche Indians which, it proudly notes, "has never been broken". Like many local children, young Allen was brought up to speak German as well as English, and it may be because of those early links that he took an interest in how Europe's most industrialised country was dealing with the problems of the environment. In the Ruhr valley he found the environmentalist's holy grail and wrote a book about it.

He described a region that contains much of Germany's heavy industry yet the rivers along which factories and mines are sited remained relatively unpolluted. You could even swim in them. Mr Kneese gave credit to the work of *Genossenschaften*, co-operatives run by industry and local government with the lightest of controls from central government.

Mr Kneese was also impressed by the frugal Danes. At Kalunborg waste heat from industry is used to heat nearby homes. "Why," he demanded, does American industry "fail to incorporate recovery and recycling practices more routinely into its operations?"

Questioning hallowed practices was, he believed, a big part of an economist's job. He built up a

respectful, although not always subservient, audience through books and articles and through his 40 years with Resources for the Future, a research organisation in Washington, DC. In 1990 he and a colleague, John Krutilla, won the first Volvo environmental prize, the next best thing in his discipline to a Nobel.

Although Mr Kneese was by nature a warmly friendly man there is in much of his writing a sense of anxiety about the future, and of the growing gap between the rich and the poor. Economics, he said, also touched on ethics. He once told a friend that he and his wife Georgia (who died in 1990) had decided not to have children because they were worried about the responsibility of bringing them into an uncertain world.

America's Atomic Energy Commission asked Mr Kneese for his comments on the possible economic effects of atomic power generation on the environment. In a long and reasoned essay he said that an economist's normal benefit-cost answer could not be given. Managing the large-scale production of energy from nuclear fission would impose a burden on mankind "essentially forever", with a penalty of possible unparalleled disaster. It would be a "Faustian bargain". During Allen Kneese's career, some bought the bargain, others hesitated over using the greatest of possible pollutants. Mr Kneese sympathised: ethical problems could be more difficult than economic ones.

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OUTPUT, DEMAND AND JOBS

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America's industrial output fell in February for the fifth month running; it finished only 1.2% higher than a year earlier. Growth of industrial production in the euro area slowed to 5.1% in the 12 months to January. The average unemployment rate in the Netherlands fell to a record low of 2.4% in the three months to February.

% change at annual rate	GDP		The Economist poll GDP forecasts		Industrial production		Retail sales (volume)	Unemployment % rate	
	3 mths†	1 year	2001	2002	3 mths†	1 year	1 year	latest	year ago
Australia	− 2.2	+ 2.1 Q4	+ 3.0	+ 4.0	− 1.5	+ 4.2 Q3	− 0.1 Q4	6.9 Feb	6.7
Austria	+ 1.2	+ 1.9 Q3	+ 2.4	+ 2.7	na	+ 2.2 Nov*	+ 1.1 Nov	3.7 Jan	3.7
Belgium	+ 4.9	+ 3.1 Q4	+ 2.7	+ 2.8	na	+ 6.7 Jan*	+ 5.0 Dec	10.6 Feb*	11.0
Britain	+ 1.0	+ 2.4 Q4	+ 2.5	+ 2.8	− 2.0	+ 1.1 Jan	+ 5.8 Feb	5.2 Jan‡	5.9
Canada	+ 2.6	+ 4.0 Q4	+ 2.6	+ 3.5	+ 1.8	+ 3.2 Dec	+ 3.9 Dec	6.9 Feb	6.8
Denmark	+ 2.0	+ 2.7 Q3	+ 2.0	+ 2.2	na	+ 4.3 Jan	− 1.0 Dec	5.3 Jan	5.4
France	+ 3.9	+ 2.8 Q4	+ 2.6	+ 2.9	+ 2.5	+ 2.9 Jan	+ 1.4 Jan	9.0 Jan	10.5
Germany	+ 0.8	+ 1.9 Q4	+ 2.4	+ 2.8	+ 2.9	+ 6.6 Jan	+ 4.8 Jan	9.3 Feb	10.1
Italy	+ 3.2	+ 2.7 Q4	+ 2.2	+ 2.6	+ 6.8	+ 9.6 Jan	− 1.4 Dec	10.1 Oct	11.1
Japan	+ 3.2	+ 2.8 Q4	+ 1.1	+ 1.7	− 4.4	+ 1.9 Jan	+ 1.8 Jan	4.9 Jan	4.7
Netherlands	+ 5.1	+ 3.1 Q4	+ 3.1	+ 3.3	+ 8.6	+ 9.4 Dec	+ 2.9 Nov	2.4 Feb§	2.8
Spain	+ 2.9	+ 3.7 Q4	+ 3.1	+ 3.5	+ 0.1	+ 4.4 Dec	na	13.7 Jan	15.0
Sweden	+ 2.4	+ 2.6 Q4	+ 3.1	+ 3.3	na	+10.1 Dec	+ 3.7 Dec	4.2 Feb*	5.4
Switzerland	+ 1.8	+ 2.5 Q4	+ 2.2	+ 2.4	+ 6.9	+ 6.9 Q3*	− 2.0 Dec	1.9 Feb*	2.4
United States	+ 1.1	+ 3.4 Q4	+ 1.6	+ 3.4	− 4.7	+ 1.2 Feb	+ 2.6 Dec	4.2 Feb	4.1
Euro area	+ 2.8	+ 3.0 Q4	+ 2.5	+ 2.9	+ 6.6	+ 5.1 Jan	+ 1.7 Dec	8.8 Jan	9.5
MORE COUNTRIES	Data for the countries below are not provided in printed editions of *The Economist*								
Finland	+ 3.0	+ 5.5 Q4	na	na	+ 2.6	+ 6.7 Jan	+ 3.6 Nov	9.9 Jan*	10.6
Greece	na	+ 2.5 2000	na	na	na	+ 3.1 Nov	+ 6.0 Nov	na	na
Iceland	na	+ 4.4 1999	na	na	na	+ 4.2 1999	na	1.3 Dec	1.7
Ireland	+21.5	+12.2 Q2	na	na	na	+32.2 Jan	+ 6.2 Dec	3.6 Feb	4.5
Luxembourg	na	+ 7.5 1999	na	na	na	+ 0.6 Dec*	+ 9.4 Nov	2.8 Jan	2.6
New Zealand	+ 2.7	+ 2.4 Q3	na	na	na	+ 2.7 Q3*	+ 7.3 Q4	5.6 Q4	6.3
Norway	+ 0.2	+ 0.9 Q4	na	na	+ 3.5	− 0.3 Jan	− 0.5 Jan	3.1 Q4	3.2
Portugal	+ 0.8	+ 2.6 Q2	na	na	na	− 0.3 Jan*	+ 3.1 Dec	3.8 Q4	4.1

*Not seasonally adjusted. †Average of latest 3 months compared with average of previous 3 months, at annual rate. ‡Nov-Jan; claimant count rate 3.4% in February. §Dec-Feb.

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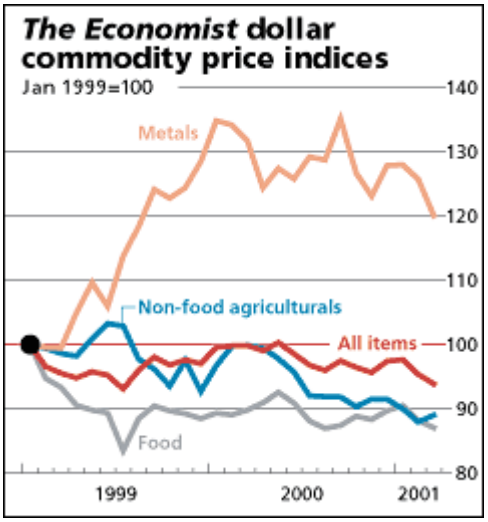
COMMODITY PRICE INDEX

Mar 22nd 2001
From The Economist print edition

Our overall dollar index of commodity prices has drifted down by 4% since the start of this year and now rests only 1.6% above its five-year low (reached in July 1999). Worries of slowing demand have killed the rally in metal prices; the index has dropped by 12% since last September. The price of nickel, once the star performer, has fallen by 40% in the past year as demand for stainless steel has flagged. Surpluses continue to depress food prices—stocks of maize, soyabeans and palm oil are still rising. Palm-oil prices are at a 15-year low, and coffee prices have fallen by 35% in 12 months. Robusta coffee hit a 30-year low thanks to Vietnam's rapidly expanding production. But cocoa prices have soared by 45% in three months because of political unrest and forecasts for a smaller crop in the Côte d'Ivoire. American timber prices have been boosted by hopes of a tax on Canadian imports.



1995=100	Mar 13th	Mar 20th*	% change on one month	% change on one year
Dollar index				
All items	70.9	70.1	– 1.8	– 6.4
Food	70.5	69.4	– 1.9	– 3.2
Industrials				
All	71.4	71.0	– 1.6	– 10.4
Nfa†	65.7	66.0	+ 2.1	– 11.6
Metals	76.2	75.2	– 4.2	– 9.4
Sterling index				
All items	77.0	77.4	– 0.7	+ 3.3
Food	76.6	76.7	– 0.8	+ 6.8
Industrials	77.5	78.4	– 0.5	– 1.0
Euro index				
All items	101.7	102.1	– 1.1	+ 0.7
Food	101.1	101.1	– 1.3	+ 4.1
Industrials	102.4	103.4	– 0.9	– 3.6
Yen index				
All items	90.6	91.4	+ 4.2	+ 7.3
Food	90.1	90.5	+ 4.1	+ 11.0
Industrials	91.2	92.6	+ 4.4	+ 2.8
Gold				
$ per oz	268.75	260.00	+ 1.1	– 10.4
Crude oil North Sea Brent				
$ per barrel	25.68	25.14	– 6.1	– 2.7
West Texas Intermediate				
$ per barrel	27.40	25.73	– 9.5	– 7.7

* Provisional. † Non-food agriculturals.

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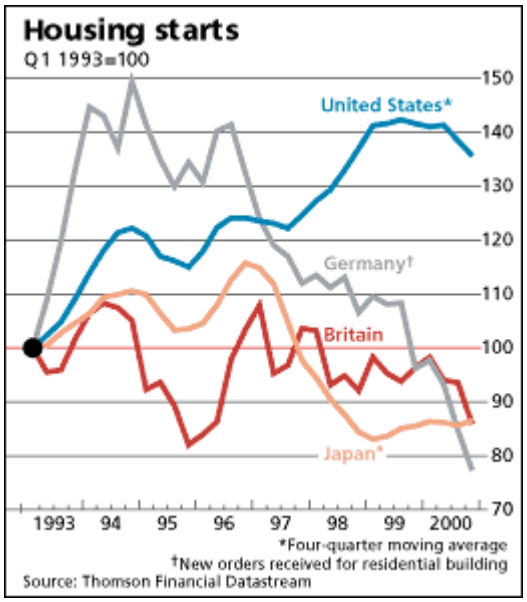
HOUSE BUILDING

Mar 22nd 2001
From The Economist print edition

Housing starts are a useful leading indicator of economic activity. Recent figures for the world's four biggest economies reinforce worries about a global economic slowdown. In America, housing starts have fallen from their peaks of the past two years. And in Japan there is no sign of an upturn in residential construction; housing starts there continue to stagnate at levels well below those of the early 1990s. In Germany, new orders for residential building have plunged in recent months. This compounds worries about the unexpectedly sharp decline this week in German business confidence. In Britain, too, housing starts have also fallen considerably. Because housing starts jump about, a four-quarter moving average is used to capture underlying trends.



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PRICES AND WAGES

Mar 22nd 2001
From The Economist print edition

America's consumer-price inflation slowed to 3.5% in the year to February. Its producer prices rose by only 0.1% last month, slowing 12-month inflation to 4.0%. In the euro area, consumer-price inflation quickened to 2.6%; in Britain it remained at 2.7%. German workers' pay rose by 2.4% in the year to January, but there was no increase in real terms.

% change at annual rate	Consumer prices*		The Economist poll consumer prices forecast		Producer prices*		Wages/earnings	
	3 mths†	1 year	2001	2002	3 mths†	1 year	3 mths†	1 year
Australia	+ 1.2	+ 5.8 Q4	+ 3.9	+ 3.0	+10.2	+ 8.4 Q4	– 3.3	+ 5.0 Q4
Austria	na	+ 2.6 Feb	+ 1.7	+ 1.7	– 1.1	+ 2.6 Feb	+ 1.9	+ 2.2 Dec
Belgium	– 0.2	+ 2.3 Feb	+ 2.0	+ 1.9	– 3.5	+ 5.4 Jan	+ 3.7	+ 1.6 Q4
Britain	– 0.1	+ 2.7 Feb	+ 2.2	+ 2.5	– 1.5	+ 1.6 Feb	+ 7.5	+ 4.4 Jan
Canada	+ 0.7	+ 2.9 Feb	+ 2.4	+ 2.2	+ 2.4	+ 3.1 Jan	– 3.0	+ 1.7 Dec
Denmark	+ 0.5	+ 2.4 Feb	+ 2.3	+ 2.3	– 4.6	+ 3.4 Feb	+ 3.0	+ 3.6 Q4
France	– 0.5	+ 1.4 Feb	+ 1.4	+ 1.5	+ 0.5	+ 3.6 Jan	+ 4.6	+ 5.3 Q3
Germany	+ 2.8	+ 2.6 Feb	+ 1.7	+ 1.5	– 1.5	+ 3.7 Feb	na	+ 2.4 Jan*
Italy	+ 3.2	+ 3.0 Feb	+ 2.2	+ 2.0	+ 4.2	+ 5.4 Jan	+ 0.9	+ 1.7 Dec*
Japan	– 0.1	+ 0.1 Jan	– 0.4	– 0.3	+ 2.7	+ 0.1 Feb	na	– 0.3 Jan
Netherlands	+ 2.6	+ 4.5 Feb	+ 3.2	+ 2.3	+ 3.6	+ 6.8 Jan	+ 2.3	+ 2.9 Jan
Spain	+ 3.0	+ 3.8 Feb	+ 2.9	+ 2.7	+ 1.5	+ 3.9 Jan	+ 3.2	+ 2.4 Q3
Sweden	na	+ 1.6 Feb	+ 1.7	+ 1.7	+ 4.4	+ 3.0 Jan	+ 3.4	+ 2.4 Dec*
Switzerland	+ 0.4	+ 0.8 Feb	+ 1.4	+ 1.3	– 0.2	+ 0.8 Feb	na	+ 0.2 1999
United States	+ 3.7	+ 3.5 Feb	+ 2.6	+ 2.3	+ 5.1	+ 4.0 Feb	+ 4.7	+ 4.1 Feb
Euro area	+ 1.6	+ 2.6 Feb	+ 1.9	+ 1.8	+ 2.6	+ 4.8 Jan	+ 1.2	+ 1.8 Q3
MORE COUNTRIES	Data for the countries below are not provided in printed editions of *The Economist*							
Finland	– 0.6	+ 3.1 Feb	na	na	– 7.4	+ 3.2 Feb	+ 3.0	+ 4.3 Q4*
Greece	– 0.4	+ 3.5 Feb	na	na	+ 0.9	+ 5.2 Jan	na	na
Iceland	+ 2.3	+ 3.9 Mar	na	na	+10.1	+ 6.0 Mar	+ 6.2	+ 9.3 Jan
Ireland	+ 1.3	+ 5.3 Feb	na	na	– 0.2	+ 3.8 Jan	+17.5	+ 7.0 Q2*
Luxembourg	+ 1.4	+ 2.9 Feb	na	na	+ 2.5	+ 5.3 Jan	+ 7.7	+ 8.4 Oct*
New Zealand	+ 4.7	+ 4.0 Q4	na	na	+15.0	+10.2 Q4	+ 1.8	+ 1.6 Q4
Norway	+ 4.3	+ 3.6 Feb	na	na	na	+ 3.8 Feb	+ 2.9	+ 3.8 Q3*
Portugal	+ 5.3	+ 4.8 Feb	na	na	+ 4.3	+ 7.3 Jan	na	+ 3.0 Nov*

*Not seasonally adjusted. †Average of latest 3 months compared with average of previous 3 months, at annual rate.

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MONEY AND INTEREST RATES

Mar 22nd 2001
From The Economist print edition

In a widely anticipated move, the Federal Reserve set a target of 5% for rates on federal funds. The half-point cut, however, failed to restore market confidence. In Japan, looser monetary policy effectively returned the economy to zero interest rates.

	Money supply*		Interest rates % p.a. (Mar 21st 2001)							
	% rise on year ago		over-	3-mth money market		banks	2-year	10-year gov't		corporate
	narrow	broad	night	latest	year ago	prime	gov't bonds	latest†	year ago	bonds
Australia	+ 9.7	+ 5.8 Jan	5.50**	5.10**	5.85	8.50**	4.36	4.99	6.36	6.32**
Britain	+ 8.4	+ 9.1 Feb	5.81	5.50	6.13	6.75	4.94	4.60	5.26	6.15
Canada	+13.7	+ 7.9 Jan	4.90	4.94	5.15	6.75	4.47	5.22	5.90	6.89
Denmark	na	+ 1.8 Dec	5.35	5.00	4.15	8.00	4.70	4.90	5.48	7.10
Japan	+ 4.7	+ 2.7 Feb	0.13	0.08	0.05	1.50	0.04	1.05	1.87	1.30
Sweden	+ 3.9	– 0.2 Feb	4.00	4.03	4.11	4.30	3.96	4.64	5.29	4.18
Switzerland	– 2.9	+ 0.9 Feb	3.55	3.44	2.50	5.50	3.21	3.27	3.84	4.15
United States	– 0.7	+10.1 Feb	5.06	4.63	6.04	8.50	4.20	4.77	6.12	6.86
Euro area‡	+ 1.4	+ 4.7 Jan	4.84	4.77	3.77	5.65	4.22	4.60	5.18	5.52

†France 4.74, Germany 4.60, Italy 5.09. Benchmarks: Japan No.229 1.05, US 30-yr 5.28. ‡Germany for prime and bonds.

*Narrow: M1 except Britain and Sweden M0, broad: M2 or M3 except Britain M4.**Last week's rates.Sources: Commerzbank, Den Danske, J.P. Morgan Chase, Royal Bank of Canada, Svenska Handelsbanken, Warburg Dillon Read, WEFA Gp, Westpac, Thomson Financial Datastream.Rates cannot be construed as banks' offers.

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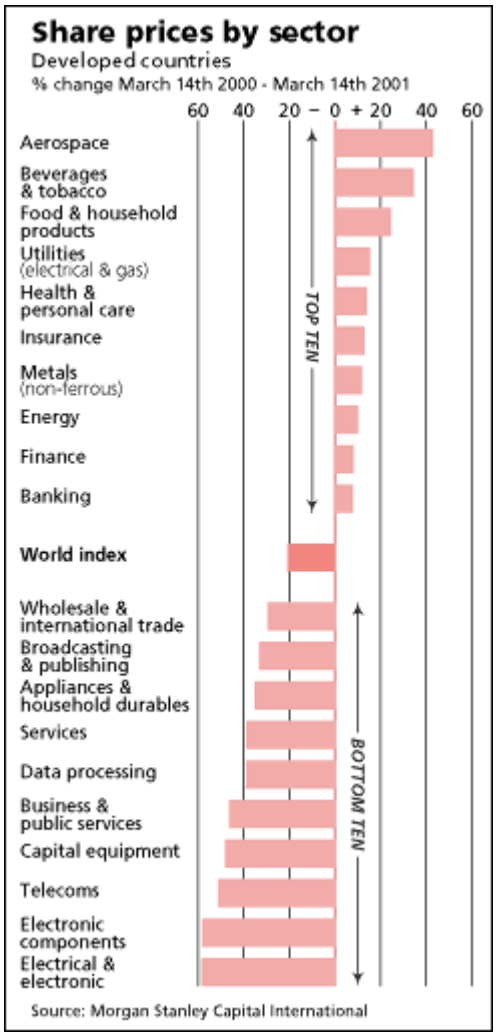
STOCKMARKET SECTORS

Mar 22nd 2001
From The Economist print edition

Average share prices around the world have fallen by over 20% since last March. The technology sector performed much worse: electrical and electronic companies' shares dipped by more than 58%, according to Morgan Stanley Capital International. But aerospace shares rose by 43%; beverage and tobacco shares jumped by 35%; and Philip Morris, a former stockmarket pariah, more than doubled in price.



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TRADE, EXCHANGE RATES AND BUDGETS

Mar 22nd 2001
From The Economist print edition

America's current-account deficit widened to $115.3 billion, a record, for the last quarter of 2000. Its trade deficit grew to $455.2 billion in the year to January. On March 21st, news of slipping business confidence in Germany dragged the euro close to a three-month low against the dollar. Two days earlier, the yen made a rapid recovery from a 22-month low against the dollar.

	Trade balance*, $bn		Current account			Exchange rate		Currency units					Budget
	latest month	latest 12 months	$bn latest 12 mths	The Economist poll % of GDP, forecast 2001	2002	trade-weighted† Mar 21st	year ago	per $ Mar 21st	per $ year ago	per £	per euro	per ¥100	balance % of GDP 2000‡
Australia	+ 0.04 Jan	– 4.3	– 15.1 Q4	-3.4	-3.6	69.2	78.0	2.03	1.65	2.90	1.82	1.64	0.9
Austria	– 0.77 Dec§	– 4.6	– 5.0 Jan	-2.4	-2.0	100.4	100.4	15.3	14.3	21.9	13.8	12.44	-1.6
Belgium	+ 0.71 Dec§	+ 13.5	+ 10.3 Sep	4.2	4.2	99.2	99.1	45.0	42.0	64.2	40.3	36.5	-0.1
Britain	– 3.48 Jan	– 42.6	– 16.3 Q3	-1.9	-1.6	105.0	107.9	0.70	0.64	–	0.63	0.57	2.7
Canada	+ 4.19 Jan	+ 37.7	+ 12.7 Q4	0.6	0.9	76.4	80.4	1.57	1.47	2.25	1.41	1.28	2.5
Denmark	+ 0.42 Jan	+ 5.0	+ 2.8 Jan	1.4	1.4	102.1	101.1	8.32	7.75	11.9	7.46	6.75	2.7
France	+ 0.28 Jan	+ 1.1	+ 24.1 Dec	1.9	1.9	101.8	101.9	7.31	6.82	10.4	6.56	5.93	-1.4
Germany	+ 6.19 Jan	+ 53.0	– 25.1 Jan	-1.2	-1.0	98.9	98.8	2.18	2.03	3.12	1.96	1.77	1.4
Italy	+ 0.14 Dec	+ 1.3	– 4.4 Dec	-0.2	-0.1	72.7	72.8	2,158	2,014	3,084	1,936	1,751	-0.1
Japan	+ 4.99 Jan	+ 111.5	+ 114.0 Jan	2.3	2.3	136.9	152.1	123	107	176	111	–	-6.0
Netherlands	+ 1.92 Dec§	+ 14.6	+ 13.7 Q4	3.9	4.2	98.1	97.9	2.46	2.29	3.51	2.20	1.99	1.6
Spain	– 3.40 Dec	– 39.5	– 17.7 Dec	-3.1	-3.1	74.3	74.3	185	173	265	166	150	-0.3
Sweden	+ 1.14 Jan	+ 14.0	+ 5.6 Jan	2.1	2.0	76.3	83.9	10.24	8.71	14.6	9.19	8.31	3.4
Switzerland	+ 0.17 Feb§	– 0.8	+ 32.5 Q3	11.8	11.3	107.8	102.4	1.71	1.67	2.44	1.53	1.39	na
United States	– 39.50 Jan	– 455.2	– 434.9 Q4	-4.3	-3.9	119.5	108.7	–	–	1.43	0.90	0.81	2.3
Euro area	+ 0.63 Dec§	+ 11.2	– 26.7 Dec	-0.2	-0.2	79.3	80.2	1.11	1.04	1.59	–	0.90	0.3
MORE COUNTRIES	Data for the countries below are not provided in printed editions of *The Economist*												
Finland	+ 1.14 Jan§	+ 13.4	+ 9.5 Jan	na	na	78.4	77.2	6.63	6.18	9.47	5.95	5.38	4.0
Greece	– 1.80 Q3	– 7.2	– 7.6 Sep	na	na	57.5	58.6	380	347	543	341	308	-1.0
Iceland	+ 0.01 Jan§	– 0.5	– 0.7 Q2	na	na	na	na	88.0	74.0	126	79.0	71.4	2.8
Ireland	+ 2.47 Dec	+ 25.9	+ 0.2 Q3	na	na	87.7	87.5	1.14	0.82	1.63	1.02	0.92	5.6
Luxembourg	– 0.18 Dec§	– 2.4	+ 1.6 Q3	na	na	99.2	99.1	45.0	42.0	64.2	40.3	36.5	na
New Zealand	+ 0.04 Jan§	– 0.6	– 3.3 Q3	na	na	79.7	84.9	2.41	2.05	3.45	2.16	1.96	0.5
Norway	+ 2.29 Feb	+ 26.2	+ 22.2 Dec	na	na	94.4	92.7	9.06	8.47	12.9	8.13	7.35	14.0
Portugal	– 1.10 Nov§	– 14.8	– 10.6 Dec	na	na	89.5	89.2	223	209	319	200	181	-1.5

*Merchandise. Australia, Britain, France, Canada, Japan and United States imports fob, exports fob. All others cif/fob. †1990=100, Bank of England. ‡OECD estimate.
§Not seasonally adjusted.

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STOCKMARKETS

Mar 22nd 2001
From The Economist print edition

Stockmarkets continued to fall, led by disappointment at the Federal Reserve's decision to cut interest rates by only 50 basis points. Tokyo bucked the trend after the Bank of Japan finally expanded the money supply; the Nikkei 225 share index climbed 10.6%.

Market indices	Mar 21st	2001 high	2001 low	% change on one week	% change on one year	% change on record high	Dec 31st 2000 in local currency	Dec 31st 2000 in $ terms
Australia (All Ordinaries)	3,170.4	3,312.1	3,154.7	– 1.3	– 3.2	– 4.8	+ 0.5	– 10.7
Austria (ATX)	1,150.9	1,219.5	1,052.2	– 3.0	+ 4.2	– 33.7	+ 7.2	+ 2.5
Belgium (Bel 20)	2,683.2	3,030.4	2,683.2	– 5.8	– 7.2	– 27.1	– 11.3	– 15.2
Britain (FTSE 100)	5,540.7	6,334.5	5,540.7	– 1.5	– 16.2	– 20.0	– 11.0	– 14.8
Canada (Toronto Composite)	7,665.5	9,348.4	7,665.5	– 1.8	– 22.3	– 32.7	– 14.2	– 18.1
Denmark (Copenhagen SE)	862.0	1,002.1	861.3	– 2.2	– 3.5	– 17.0	– 4.9	– 9.1
France (SBF 250)	3,233.4	3,820.2	3,233.4	– 2.3	– 19.3	– 26.4	– 14.3	– 18.0
Germany (Xetra DAX)	5,622.1	6,795.1	5,622.1	– 3.0	– 27.9	– 30.3	– 12.6	– 16.5
Italy (BCI)	1,647.8	1,948.4	1,647.8	– 0.3	– 19.3	– 24.5	– 14.0	– 17.8
Japan (Nikkei 225)	13,103.9	14,032.4	11,819.7	+ 10.6	– 33.6	– 66.3	– 4.9	– 11.9
(Topix)	1,275.4	1,313.0	1,162.0	+ 9.8	– 23.1	– 55.8	– 0.6	– 7.9
Netherlands (EOE)	542.1	642.3	542.1	– 4.6	– 20.2	– 22.7	– 15.0	– 18.7
Spain (Madrid SE)	850.8	963.9	850.8	– 4.8	– 22.7	– 25.8	– 3.4	– 7.7
Sweden (Affarsvarlden Gen)	230.7§	292.7§	230.7§	– 11.2	– 40.2	– 42.3	– 16.8	– 23.3
Switzerland (Swiss Market)	6,965.2	8,135.4	6,965.2	– 3.6	– 5.7	– 17.2	– 14.4	– 18.7
United States (DJIA)	9,487.0	10,983.6	9,487.0	– 4.9	– 12.7	– 19.1	– 12.1	– 12.1
(S&P 500)	1,122.1	1,373.7	1,122.1	– 3.8	– 25.2	– 26.5	– 15.0	– 15.0
(Nasdaq Comp)	1,830.2	2,859.2	1,830.2	– 7.2	– 62.4	– 63.7	– 25.9	– 25.9
Europe (FTSE Eurotop 300) *	1,333.8	1,545.5	1,333.8	– 1.8	– 18.4	– 21.8	– 13.0	– 16.9
Euro area (FTSE Ebloc 100) *	1,194.6	1,404.1	1,194.6	– 1.6	– 18.9	– 23.0	– 14.2	– 18.0
World (MSCI) †	1,039.6	1,249.2	1,039.6	– 2.5	– 26.9	– 28.2	na	– 15.4
World bond market (Salomon) ‡	437.1	447.8	436.7	– 0.8	+ 1.3	– 4.9	na	– 1.6

*In euro terms. †Morgan Stanley Capital International index includes individual markets listed above plus eight others, in dollar terms.
‡Salomon Smith Barney World Government Bond Index, total return, in dollar terms. §Rebased.

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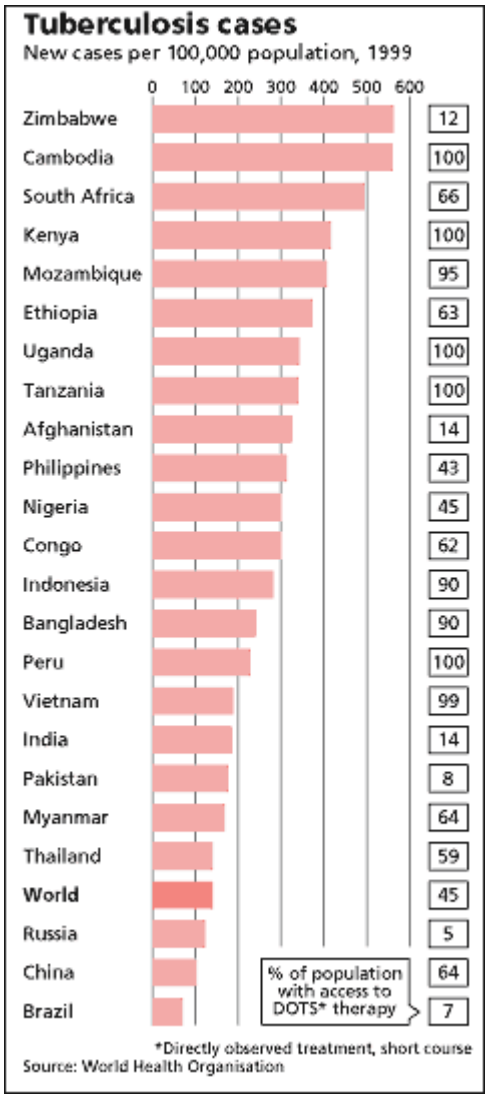
CLONE TEST: TUBERCULOSIS

Mar 22nd 2001
From The Economist print edition

A new report from the World Health Organisation (WHO) estimates that 8.4m people developed tuberculosis in 1999. Zimbabwe, Kenya and other countries in sub-Saharan Africa were hit hardest because of their high rates of HIV infection. Patients with that disease are predisposed to contacting TB and account for much of the rise in new cases since 1997. Without treatment, 70% of people with TB die. But there is a cost-effective therapy—DOTS, a supervised regimen that involves treatment with two cheap antibiotics for up to eight months. The entire populations of Cambodia, Kenya, Peru, Tanzania and Uganda have access to DOTS. Thailand and Brazil have almost doubled their DOTS coverage since 1998, but others, such as Zimbabwe, have fallen behind. The WHO fears that the global goal of detecting 70% of people with infectious TB and curing 85% of them will not be reached until 2013, eight years later than the target set by health ministers in 2000. On March 21st, the organisation launched a drug-purchase fund—the Global TB Drug Facility—to help poor countries to buy the medicines they need to fight the disease. The WHO hopes to raise $250m to provide TB drugs for 10m patients over the next five years.



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FINANCIAL MARKETS

Mar 22nd 2001
From The Economist print edition

In spite of falling share prices in most of the world, three markets managed to climb: Istanbul, by 5.9%, led by the tourism sector; Warsaw, by 4.6%, boosted by high-tech shares; and Moscow, by 4.4%, on strong domestic demand. Most currencies fell against the dollar, but the Turkish lira and some Latin currencies managed small rises.

	Currency units			Interest rates	Stockmarkets	% change on		
	per $		per £	short-term	Mar 21st		Dec 31st 2000	
	Mar 21st	year ago	Mar 21st	% p.a.		one week	in local currency	in $ terms
China	8.28	8.28	11.8	5.40	2,169.5	+ 2.3	– 1.0	– 1.0
Hong Kong	7.80	7.79	11.1	4.94	13,154.4	– 1.3	– 12.9	– 12.9
India	46.7	43.6	66.7	7.96	3,791.1	+ 1.8	– 4.6	– 4.6
Indonesia	10,435	7,425	14,915	15.48	369.1	– 5.2	– 11.3	– 17.8
Malaysia	3.80	3.80	5.43	3.30	673.2	– 1.3	– 0.9	– 0.9
Philippines	48.5	40.9	69.2	10.88	1,471.6	– 3.4	– 1.5	+ 1.6
Singapore	1.78	1.71	2.55	2.25	1,728.0	– 3.6	– 10.3	– 12.9
South Korea	1,303	1,113	1,862	5.68	532.6	– 2.0	+ 5.5	+ 2.5
Taiwan	32.8	30.7	46.8	4.70	5,623.4	– 0.6	+ 18.5	+ 19.7
Thailand	44.3	37.8	63.3	2.50	291.2	– 2.9	+ 8.2	+ 6.0
Argentina	1.00	1.00	1.43	10.19	428.1	– 4.8	+ 2.7	+ 2.5
Brazil	2.10	1.73	3.01	15.24	14,852.7	– 2.6	– 4.8	– 11.7
Chile	586	504	838	3.93*	4,937.9	– 0.1	+ 1.4	– 0.7
Colombia	2,285	1,956	3,265	13.18	818.7	– 1.4	+ 14.9	+ 12.4
Mexico	9.52	9.28	13.6	16.06	5,769.7	– 0.8	+ 2.1	+ 3.1
Peru	3.52	3.47	5.0	9.72	1,271.9	– 0.2	+ 5.3	+ 5.4
Venezuela	705	668	1,007	10.19	7,634.7	nil	+ 12.4	+ 11.6
Egypt	3.88	3.43	5.55	9.10	6,276.2	– 2.5	– 18.1	– 18.0
Israel	4.20	4.00	6.00	5.51	392.8	– 1.5	– 20.6	– 23.5
South Africa	7.99	6.45	11.4	10.45	8,474.1‡	– 0.8	+ 1.8	– 3.6
Turkey	980,000	583,710	1,400,714	76.00	8,629.2	+ 5.9	– 8.6	– 37.5
Czech Republic	38.5	37.0	55.0	5.06	444.6	+ 0.3	– 7.1	– 9.1
Hungary	297	267	424	11.24	6,678.9	– 1.2	– 14.9	– 19.1
Poland	4.12	4.01	5.89	18.03	14,709.6	+ 4.6	– 17.6	– 17.3
Russia	28.7	28.4	41.1	25.00	174.9†	+ 4.4	+ 22.4	+ 22.0

*Inflation adjusted. †In dollar terms. ‡March 20th.

Sources: National statistics offices, central banks and stock exchanges; Primark Datastream; EIU; Reuters; Warburg Dillon Read; J.P. Morgan; Hong Kong Monetary Authority; Centre for Monitoring Indian Economy; FIEL; EFG-Hermes; Bank Leumi Le-Israel; Standard Bank Group; Akbank; Bank Ekspres; Deutsche Bank; *Russian Economic Trends*.

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ECONOMY

Mar 22nd 2001
From The Economist print edition

South Korea's GDP fell by 0.4% in the fourth quarter of 2000 after a significant decrease in domestic demand. Year-on-year growth slowed to 4.6%. Consumer prices in South Africa rose by 7.8% in the 12 months to February, more than expected. The news dashed hopes of an interest-rate cut in the near future, and the rand tumbled to a record low against the dollar.

	% change on year earlier			Latest 12 months, $bn		Foreign reserves*, $bn	
	GDP	Industrial production	Consumer prices	Trade balance	Current account	Latest	Year ago
China	+ 7.3 Q4	+10.2 Feb	+ 1.6 Feb‡	+23.6 Feb	+15.7 1999	168.3 Dec	157.7
Hong Kong	+ 6.8 Q4	− 0.1 Q3	− 1.2 Jan	−10.4 Jan	+ 9.4 Q3	114.3 Feb	93.1
India	+ 6.0 Q2	+ 2.8 Jan	+ 3.2 Jan	− 7.8 Jan	− 5.6 Q3	39.0 Feb	33.5
Indonesia	+ 5.2 Q4	+ 4.5 Q4‡	+ 9.1 Feb	+28.0 Jan	+ 6.1 Q1	22.6 Dec	26.5
Malaysia	+ 6.5 Q4	+12.5 Jan	+ 1.6 Feb	+15.6 Jan	+ 9.7 Q3	29.1 Jan	32.2
Philippines	+ 3.6 Q4	+ 8.6 Dec	+ 6.7 Feb	+ 7.3 Jan	+ 8.2 Nov	13.1 Dec	13.2
Singapore	+10.5 Q4	− 9.9 Jan	+ 2.0 Jan	+ 4.0 Jan	+21.8 Q4	80.1 Dec	76.8
South Korea	+ 4.6 Q4	+ 0.1 Jan	+ 4.2 Feb	+12.9 Feb	+11.5 Jan	95.4 Jan	76.7
Taiwan	+ 4.1 Q4	+ 9.1 Feb	− 1.0 Feb	+ 9.1 Feb	+ 9.6 Q4	110.1 Feb	113.6
Thailand	+ 3.1 Q4	+ 3.5 Jan	+ 1.5 Feb	+ 4.0 Jan	+ 7.8 Jan	32.2 Jan	31.9
Argentina	nil Q3	− 0.1 Feb	− 1.7 Feb	+ 1.3 Jan	−10.5 Q3	25.2 Dec	26.3
Brazil	+ 4.4 Q4	+11.2 Jan	+ 5.9 Feb	− 1.1 Feb	−26.0 Jan	32.5 Dec	34.8
Chile	+ 5.8 Q3	− 2.3 Jan	+ 3.8 Feb	+ 1.5 Jan	− 1.0 Q4	14.7 Dec	14.4
Colombia	+ 2.1 Q4	+ 5.0 Jan	+ 8.1 Feb	+ 2.3 Dec	+ 0.2 Q3	9.3 Feb	8.1
Mexico	+ 5.1 Q4	+ 1.9 Jan	+ 7.1 Feb	− 8.6 Jan	−17.7 Q4	39.4 Jan	33.6
Peru	− 1.6 Jan	− 5.1 Dec	+ 3.6 Feb	− 0.4 Jan	− 1.7 Q4	8.4 Dec	8.7
Venezuela	+ 3.3 Q3	na	+ 12.7 Feb	+ 6.6 Oct	+13.4 Q4	13.9 Jan	12.3
Egypt	+ 6.5 2000†	+ 9.4 2000†	+ 2.3 Dec	−10.4 Q4	− 0.8 Q4	13.1 Nov	15.0
Israel	+ 3.0 Q4	+ 2.3 Dec	+ 0.3 Feb	− 7.1 Feb	− 0.7 Q3	23.4 Feb	22.1
South Africa	+ 3.3 Q4	+ 5.7 Jan	+ 7.8 Feb	+ 3.4 Jan	− 0.5 Q4	6.1 Jan	6.4
Turkey	+ 7.4 Q3	+ 6.5 Jan	+ 33.4 Feb	−26.5 Dec	− 9.8 Dec	20.0 Dec	23.3
Czech Republic	+ 3.9 Q4	+13.8 Jan	+ 4.0 Feb	− 3.3 Feb	− 2.3 Q4	13.0 Jan	12.8
Hungary	+ 4.2 Q4	+ 6.4 Jan	+ 10.4 Feb	− 2.5 Jan	− 1.9 Jan	10.8 Jan	11.2
Poland	+ 2.4 Q4	− 0.1 Feb	+ 6.6 Feb	−11.0 Jan	− 9.8 Jan	25.3 Dec	24.5
Russia	+ 7.7 2000	+ 0.8 Feb	+ 22.3 Feb	+61.0 Dec	+43.8 Q3	25.9 Jan	8.9
MORE COUNTRIES	Data for the countries below are not provided in printed editions of *The Economist*						
Pakistan	+ 3.9 1999†	+ 4.6 Jul	+ 4.6 Feb	− 1.9 Jan	− 2.5 1999	1.5 Dec	1.5
Saudi Arabia	+ 0.4 1999	na	− 1.3 Dec	+24.9 1999	+ 0.4 1999	19.6 Dec	17.0

*Excluding gold, except Singapore; IMF definition. †Year ending June. ‡New series.

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